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# THE PRACTITIONER:

## A JOURNAL

## OF

## THERAPEUTICS AND PUBLIC HEALTH.

EDITED BY

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## Original Communications.

# CANCER OF THE STOMACH, OR IDIOPATHIC ANÆMIA?

BY RICHARD NEALE, M.D.

THE following case well illustrates the impossibility of arriving, in some instances, at a positive diagnosis between these diseases. No attempt will be made to give detailed notes, but merely a bare summary of the symptoms, and the conclusions arrived at. On October 22, 1880, I was called to see a gentleman, aged 61, who for some time past had been feeling unwell, causing his wife considerable anxiety. He was stout, exsanguine, with an aspect highly cachetic, heart's impulse excessively weak, dyspnœa being excited by the least exertion. Great debility was complained of, with a feeling of being generally unwell, but *no ache or pain was anywhere felt.* There was a great distaste for food, and a feeling of uneasiness after eating, and often considerable flatulence. The bowels were confined. A stomachic pill and a general tonic were prescribed, milk, as food, was ordered to be taken liberally, and strict injunctions were given that no exertion should be undertaken; especially going up and down stairs was to be avoided. October 25th. Suddenly called, as patient was thought to have fallen dead on the landing, while going up stairs. With a bottle of nitrite of amyl I hurried across the road, to find only a faint trace of a flickering pulse, while the blue lips and blanched skin showed how nearly circulation had ceased. The vapour of the amyl was passed into the nostrils, and in a few moments respiration and circulation were regained. After a time the patient was carefully carried to his bed, and was not again allowed to assume the erect posture for many weeks. Auscultation revealed dulness and crepitation at the base of both lungs, more especially the right. The temperature was 102° in the mouth; there was no cough or expectoration. The urine was pale, copious, free from albumen. At the time of the syncope, the patient had freely vomited a matter like modified red-currant jelly, and this drew special attention to the gastric symptoms, which were slight, but still the only tangible symptoms present, excepting the basic crepitation. I learnt on inquiry that a brother had died from intestinal cancer, attended with obstruction. A somewhat similar case had occurred in my practice several years previously, which had been diagnosed in consultation "Pernicious Anæmia," the true nature of the case not having been suspected until the cancerous mass, situated on the posterior wall of the stomach near the pylorus, had become so developed as to be capable of detection a short time before death. Consulting my trusty friend and guide, *The Medical Digest*, I there found noted, under the heading "Diagnosis of Pernicious Anæmia," "simulated by cancer of the stomach." This referred to a case reported in the *New York Medical Review* of January, 1878 (subsequent to the first edition), which presented nearly identically the same absence of symptoms as was present in the patient whose case I am now relating, and where also the post-mortem alone revealed that gastric cancer was the true disease. The diagnosis I formed and expressed at the time the syncope and vomiting occurred, in the case now under notice, was that malignant disease of the stomach would, in all probability, be found to be at the root of the mischief, that the heart and tissues generally were fatty, and that the extreme dyspnœa was neurosal, due either to reflex influence or to some deposit in the mediastinal glands pressing upon the cardiac plexus. The pulmonary condition was difficult to explain; that there was an inch or more of dulness over which fine crepitation could be heard was evident, yet it did not give the impression that pneumonia was the cause, notwithstanding the high temperature, which kept up for more than a week, and then fell to normal, not being again noted until November 10th, when the patient, not progressing satisfactorily, and my opinion being the reverse of hopeful, Dr. A. was asked to meet me in consultation.

A most careful examination, taken in connection with my own bias, caused this gentleman to feel that anæmia was most probably the cause of the mischief, and that although disease of the suprarenal capsules and cancer of the stomach were not excluded from probable causes, yet the balance of such evidence as could be obtained rather pointed to the absence of either. I have suggested that the peculiar aspect of the vomited matter might have been due to some port wine, previously taken, or Dr. A. thought it possible it was pneumonic sputum which had been swallowed. The treatment hitherto pursued, which consisted of quinine, iron, strychnia, arsenic, milk diet, and such food as could be taken (and this was often considerable in amount), was decided upon as that to be still followed. The temperature was at this date carefully taken by the son of the patient, one of Guy's advanced and earnest students, and ranged from 100°·2 to 98°·8, rising on the 24th of November to 101°·8, sinking on the 27th to 99°·3, running up and down in a very remarkable manner. On November 26th, after another very careful consultation with Dr. B., this gentleman agreed with Dr. A. that the symptoms pointed to anæmia rather than to cancer, although this latter view of the nature of the case was by no means improbable. In addition to the previous mode of treatment, it was advised that hæmatine, as enemata, should be given, and port wine be taken as freely as the patient was able, together with as much solid food, especially underdone meat, as possible. The facility with which the wine and food were often taken, often, I must own, shook from time to time my faith in the presence of cancer. On December 10th, an attack of exhaustion came on, attended with great dyspnœa, sickness, and profuse sweating. The matter vomited was clear and fluid; no blood. The temperature in the axilla, 11 A.M., was 101°·6. At 9 P.M. it had fallen to 99° with a dry skin. On the 11th the temperature was 100°·2, and on the 18th, 98°·4. On the 20th, 11 A.M., 100° with sweats, 9 P.M. 102°, skin dry; then it ranged from 101°·2 to 98°·4. On December 24th, 9 P.M., the pulse was 108 and temperature 100°·2. 25th, 11 A.M., pulse 92, temperature 98°; P.M., pulse 116, temperature 100°. 26th, A.M. 97°·8 with a pulse of 108. The temperature did not rise above 99°·8, or sink lower than 98°·4 until January 5th, when P.M. it rose to 101°·2, with a pulse of 88, sinking on the 7th to 98°·20. During February on one occasion, 15th, the evening temperature was 100°·2, the morning temperature of the 14th having been 97°·8. The charts were not kept after the end of February. The general condition of the patient during January and February remained unchanged, he could not walk from bed to sofa without great dyspnœa. The urine at times yielded traces of blood and albumen, but was generally free from such. He constantly said "I feel well but weak; I have not an ache or pain."

On February 23rd, Dr. C. saw the case in consultation. This gentleman had attended, with me, the case alluded to in the early part of this paper, when death alone revealed the true cause of the so-called "pernicious anæmia." He most carefully examined the patient, with the previous case in remembrance, and bearing also in mind my strong conviction that we had to deal with concealed cancer of the posterior wall of the stomach, overwhelming the cardiac nerves either by reflex influence or from direct pressure of some diseased mediastinal glands, yet no other conclusion was arrived at than that "idiopathic anæmia" was the cause of all the trouble, and that therefore there was a possible chance of the patient improving. This opinion was given to friends and patient both, and the wonderful improvement that took place during the following months seemed to justify the prognosis. Quinine and iron were still given, with arsenic, as much as could be borne, and as the weather grew more genial, the patient first changed his room, then came down stairs, and wrote many pages of a work on which he was then engaged. Gradually drives were enjoyed, colour returned to fingers and face, and on June 10th he left for Worthing, where he stayed for several weeks, returning to London a *new man*. So much had he benefited by this sojourn at the sea, that it was decided to take up house there. Accordingly he left London August 4th, bearing the journey well, although for some days previous to leaving for Worthing he had been far less well than on his return. On August 5th several attacks of syncope and vomiting occurred. The vomiting ceased after a few doses of hydrocyanic acid. August 9th, free hæmatemesis set in, and continued at intervals until August 23rd, when death closed the scene. During his last days he was ably cared for by his son and Mr. Parish. The following are the notes of the post-mortem, kindly forwarded me by those gentlemen:—

Stomach—anterior surface normal; when laid open, the greater part of posterior wall was found occupied by a growth which encircled the œsophageal opening and extended to the pylorus but did not surround it; the stomach could only be removed piecemeal, as the growth was very soft, breaking down readily under the finger. The posterior wall of the stomach was formed by the mass of the growth, and being continuous by infiltration with the muscles of the back could not be removed. The edges of the growth were well defined and raised half an inch above the healthy mucous membrane. Thickening of the muscles could be detected externally on the back. The growth was adherent to, but did not implicate the spleen, which was small and anæmic. The colour was pinkish, dotted over with small extravasations of blood; the surface was ragged and flocculent. The greater part was extremely soft and pulpy, secreting copiously a milky juice.

Liver—fatty, not tough, no growth.

Kidneys—rather large and pale, no growth.

The examination did not extend to other organs.

*Remarks.*—The great interest of this case lies in the obscurity of the symptoms. The reasons that led at first to fear gastric cancer have been explained, and it is certain that had either of the three gentlemen, who at different times examined the case—gentlemen whose acumen and diagnostic accuracy are well known—seen the peculiar vomit of the early stage, they would have felt satisfied that a cancerous stomach could alone eject such matter. The vomit was thrown away before there was a chance of examining it microscopically, a fact much to be regretted, as this was really the only positive objective symptom that occurred during the ten months the patient was under observation, until two weeks before death, when the true nature of the case could be no longer concealed.

*Notes by Dr. A.*—It is worth consideration whether the singular deficiency of symptoms is not characteristic of the softer kinds of cancer rather than of schirrus cases, the pressure of the latter upon included and surrounding tissues being more intense. Query, Was not in this case the circulation of the spleen interfered with, and the sanguification disturbed, giving the very early anæmic symptoms ?

# ON SOME POINTS IN THE PATHOLOGY OF ANÆMIA, AND ON THE ACTION OF IRON AND ARSENIC.

BY FREDERICK WILLCOCKS, M.D., LOND., M.R.C.P.

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In the present series of observations, the various fluctuations of the red discs, occurring in chlorotic anæmia during treatment by iron, have been followed and described. Variations may occur both in number and colour, but in this complaint one element of the blood is mainly affected, viz. the hæmoglobin. This comparative simplicity of the blood lesion, as compared with that of the various forms of symptomatic anæmia, as well as its rapid response to chalybeate treatment, render the affection an excellent field for hæmometric observation. The cases detailed were severe and uncomplicated, *and had received no recent treatment previous to examination.* The observations have extended over a considerable period of time, in one case for nearly a year, and were made at definite, usually weekly, intervals. The instruments used were the chromometer and numerator of Hayem (the latter as modified by Dr. Gowers), similar to those employed by Dr. E. B. Baxter and myself in a former series of observations.[1] We then pointed out that our numerator probably gave numbers somewhat higher than normal, and a careful subsequent examination has shown that the cell is rather too deep. In the present numerations, therefore, a slight correction has been introduced throughout, which, while it renders the numbers more nearly absolutely correct, will not of course affect their relative significance. To eliminate as far as possible any instrumental error in the numerations, more than one drop of the mixture has been invariably counted, and, in the case of any marked discrepancy, three or four have been examined; the mean of the observations has then been taken. The same numerator and chronometer have been used throughout, and the blood always drawn from the finger without pressure.

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[1] "A Contribution to Clinical Hæmometry," *Lancet*, March 6th, 13th, 20th, 1880.

The average normal number of red discs consistent with cure and apparent health varied considerably in individual cases. The normal numerical standard is also liable to large fluctuations from comparatively insignificant causes. Thus menstruation, which affects but slightly the healthy or more developed organism, produces in chlorotic cases, even when apparently cured, large oscillations in number, without, however, influencing the absolute colour of the blood to any great extent. These small, periodic hæmorrhages, as will be shown later in the present paper, form not improbably, an important factor in the causation of chlorosis. Allowance must therefore be made for these natural variations in estimating the influence of a drug on the course of the disease.

A diluting fluid of constant strength, that recommended by Dr. Gowers (sodæ sulph. gr. 104 acid acet. ʒj. aq. destill ad ℥ iv.) was employed. This solution, although it changes the appearance of the corpuscles somewhat, has no influence on their diameter. The average diameter of corpuscles examined in this fluid, and in ·75 per cent. salt solution, was practically identical. The measurements given in the present paper were taken by an eyepiece micrometer, and the corpuscles were examined in the above solution. Moriez has pointed out that large accumulations of small, feebly-coloured elements may be seen in the blood during recovery on iron, and my own observations have frequently confirmed this point. These additions are also present whenever the blood is undergoing repair, as after menstruation, and may occur quite independently of iron treatment. Further reference will be made later to these points.

Relapse in the first case occurred on two occasions on the cessation of iron, and the variations both in the number and colour of the discs were carefully examined throughout. Several preparations of iron were used, and a somewhat striking difference of action was observed between large and small doses of the remedy.[1] The results of the treatment will be found incorporated in the details of the cases. Arsenic was given in two chlorotic cases with a negative result, but in a later case of intense anæmia (Caroline F., case II.) it had a most beneficial action.

In the charts, and in the details of the cases, N represents the actual number in millions of red corpuscles per cubic millimetre ; R represents the absolute hæmoglobin richness of the blood in terms of normal red corpuscles according to Hayem's scale, and G equals $\frac{R}{N}$, or the relative value of the individual corpuscles in hæmoglobin.

At the end of the paper an Appendix has been added, showing the results of the blood examination in three cases of intense or "pernicious" anæmia, and a comparison is drawn between the influence of iron and arsenic in these cases and in chlorotic anæmia.

My thanks are especially due to Dr. T. C. Hayes for kindly allowing me to examine several typical cases of chlorosis under his charge, both in King's College and the Royal Free Hospitals.

*Definition of Chlorosis.*—In the present paper, under the term "chlorosis," are included certain cases of anæmia, occurring in young women at the period of menstrual evolution. Clinically they are characterised by a peculiar pallor of the face, by blanching of the mucous membranes, venous and cardiac murmurs, and menstrual irregularities. The nutrition of the body is usually unimpaired. Shortness of breath, gastric and nervous symptoms, are often prominent. These cases rapidly respond to large doses of ferruginous preparations, and while in some, repeated relapse is not uncommon, others tend towards spontaneous cure.

The blood lesion of chlorosis has been summed up by Professor Hayem, as consisting in an excessive accumulation in the blood of young and intermediate forms of red discs. These are feebly coloured, and therefore not only is the total amount of hæmoglobin in a given volume of blood diminished, but the functional value of the individual corpuscle is also very low. The great impoverishment in colouring matter of the individual corpuscle is not, however, peculiar to chlorosis, although it is a constant and more intense lesion in that affection than in the various forms of chronic symptomatic anæmia. It is present, for example, in a marked degree in the blood of patients *recovering* from hæmorrhage, or in those who have suffered from small repeated hæmorrhages. After severe hæmorrhage or fever and the like, the whole mass of the blood is reduced, and consequently the relative Hb. value may remain normal, but during recovery young forms are added in abundance, and the relative hæmoglobin value decreases.[1]

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[1] Since the present paper was ready for publication, my attention has been drawn by the kindness of Dr. Lauder Brunton to the recently published researches of Laache (*Die Anämie von S. Laache*, Christiania, 1883). An explanation of the discrepancy to which he refers, between the results obtained by himself and other continental observers, and some of those published by Dr. Baxter and myself in our former paper, will be found in a later section of the present contribution, under the heading of "Large and Small Doses of Iron in Chlorosis."

Dr. Norris[2] is of opinion that the reduction of the average hæmoglobin per corpuscle is the one condition *invariably* present in anæmia, but this fact, though undoubtedly true for the vast majority of cases, cannot, as I shall have occasion to show later, be universally applied. In the most intense forms of anæmia commonly classed as "pernicious or essential," in which the formation of new red discs appears to be reduced to a minimum, the hæmoglobin value of the individual corpuscle may be equal to, or even considerably exceed, the normal.

In chlorotic anæmia, the great reduction of the average hæmoglobin per corpuscle is associated with certain well-marked anatomical changes in the blood, these changes affecting the corpuscles both as regards their number, size, and appearance. The number of the red discs varies considerably in different cases, in some almost approaching the normal standard, in others falling considerably below it. As regards size, both large and small forms are relatively more numerous than in normal blood. In healthy blood Hayem places 75 per cent. of the corpuscles as of mean size ($7{\cdot}5\ \mu$),[3] 12 per cent. as large ($8{\cdot}5\ \mu$), and 12 per cent. as small ($6\ \mu$ to $6{\cdot}5\ \mu$). In chlorotic blood both the larger and smaller forms are relatively more abundant, the latter, however, being most numerous, and consequently the average corpuscular diameter in these cases is lower than normal. On this point Hayem is in opposition to Melassez, who considers that the average corpuscular diameter in chlorosis exceeds the normal. In the most severe forms of anæmia (pernicious), in which small, young elements may be almost entirely absent, the majority of the corpuscles are undoubtedly larger than normal; and not improbably the discrepancies between various observers may be explained by the fact that different forms of anæmia have been included under the same term, "chlorosis." In my own measurements in the cases of chlorosis, detailed in the present paper, the majority of corpuscles were decidedly smaller, more especially during the early stage of iron treatment, when a large addition of young, small elements is made to the blood. Hayem considers that these small corpuscles (*globules nains*), which become easily altered in shape, and distorted in the presence of re-agents, are intermediate forms between the smallest particles found in the blood (hæmatoblasts) and the adult red discs.[1] The hæmatoblasts are found in normal blood in a proportion of one to twenty adult red, but in cases of anæmia, chlorotic or symptomatic, in which the blood is undergoing recuperation, they become relatively more abundant. Thus after hæmorrhage, acute fevers, &c., Hayem has described a distinct "hæmatoblastic crisis," in which the proportion of these elements is temporarily increased; and the increase in hæmatoblasts is subsequently followed by a considerable addition of small, new discs to the blood. From this, and other reasons, Prof. Hayem infers that the new, feebly coloured discs are directly produced from the hæmatoblasts. On this still somewhat debateable point it would, however, be foreign to the present paper to enter, but it should be mentioned that Dr. Norris, while agreeing with Hayem in his description of the hæmatoblasts, considers them to be merely fragments of the third or invisible corpuscle which he has described in the blood.

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[1] *Lancet*, March 6th, 13th, 20th, 1880.

[2] *The Physiology and Pathology of the Blood*, p. 165. Richard Norris, M.D., 1882.

[3] $\mu = {\cdot}001$ millimetres.

The serum in chlorosis is, according to the analyses of Quinquad, normal in quality, although its quantity is probably diminished. The absence of any great wasting in chlorosis is usually explained by this fact. In healthy blood 1,000 grammes of serum contain from 92 to 94 grammes of solid matter, while in chlorosis the amount of solid matter in the same quantity of serum varies from 88 to 94 grammes.

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[1] "On the Granular Matter of the Blood," E. H. Howlett. F.R.C.S., *Lancet*, February 11th, 1882. See *Recherches sur l'anatomie normale et pathologique du sang*, p. 104, &c., Hayem, for a full description of these particles—(hæmatoblasts).

According to our present knowledge chlorosis may be defined as a form of anæmia, occurring at the period of menstrual evolution, and characterised by definite clinical features. It presents a severe and constant lesion, consisting in the addition to the blood of a large number of young, imperfectly-coloured elements, and in consequence the hæmoglobin value of the individual corpuscle is reduced far below the normal. This lesion, though not characteristic of chlorosis, is more intense in this affection than in the large majority of anæmic cases, and the serum at the same time remains unaffected in quality. In other words, the blood in untreated cases of chlorosis is in a constant condition of imperfect evolution.[1]

## CASES OF CHLOROTIC ANÆMIA.

CASE I.—Emma D., aged 19, September 9, 1881. Great pallor for the last two years. Attended Out Patients' Department of King's College Hospital on two previous occasions—firstly under Dr. Baxter, when she took powders (Ferri Carb. Sacch.) for seven or eight weeks, and secondly under Dr. Curnow, last May, when she was given a mixture. On both occasions she became much better, and thinking herself cured, discontinued her attendance, but all the symptoms rapidly returned. Menses appeared at 15, "too much" at first for some months, always fairly regular, but missed last June and August. Flow usually copious and lasts about four days.

*Present condition.*—Great pallor of face, lips, and conjunctivæ. No œdema of feet, nor emaciation. Dyspnœa on exertion, and palpitation. Loud bruit de diable in jugulars; systolic bruit over pulmonary cartilage. Lungs normal.

℞. Ferri redacti, gr. v. tds.
Pil. Aloes Soc., gr. v. prn.

$N = 2{,}350{,}000$; $G = \cdot 34$.

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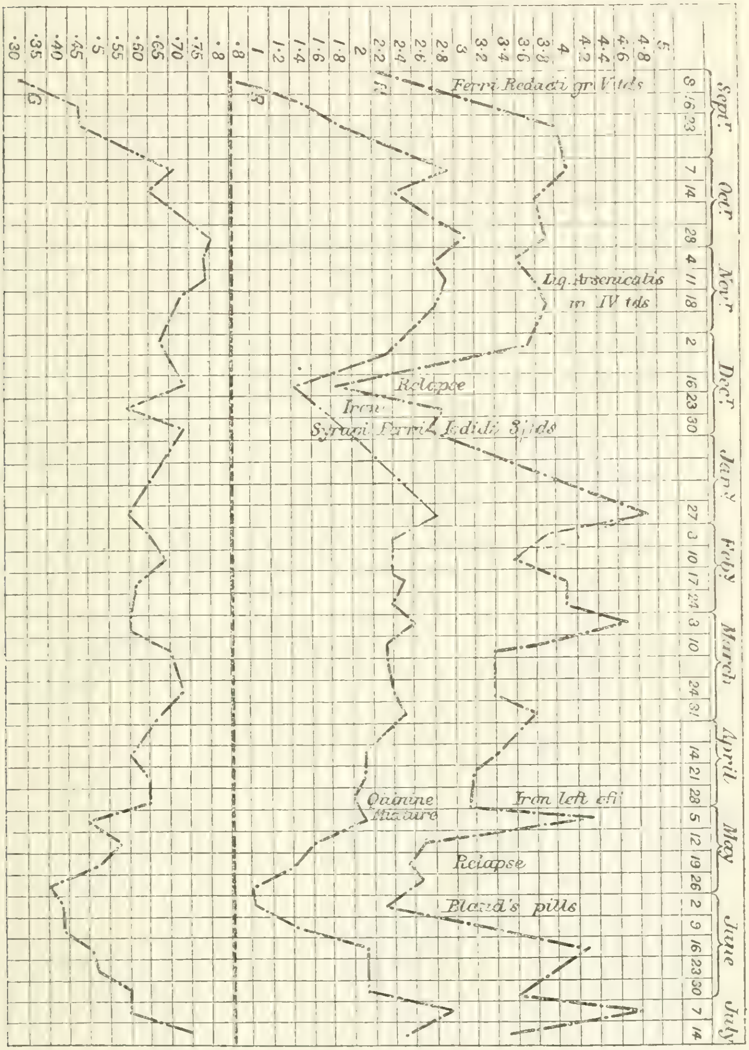
[1] Moriez, *La Chlorose.*

*September* 16.—Less headache and dyspnœa; feels better and stronger. Face very pale; lips and conjunctivæ slightly better colour.

N = 3,100,000; G = ·45.



*September* 23.—Feels and looks much better. No menses.

N = 3,930,000; G = ·45.

*October* 7.—Appearance good; lips and conjunctivæ a good colour. No dyspnœa.

N = 4,030,000; G = ·69.

*October* 14.—Takes the powders regularly. No menses. Good colour.

N = 3,710,000; G = ·61.

*October* 28.—Menses reappeared on October 17. None in August and September. Good appetite; appearance normal. No symptoms.

N = 3,820,000; G = ·78.

*November* 4.—Condition continues good.

N = 3,510,000; G = ·76.

*November* 11.—Appearance normal. Diarrhœa during last week. No nausea or sickness.

N = 3,720,000; G = ·76.

The reduced iron was left off, and she was given Liq. Arsenicalis, ♏ v., Infus. Calumbae ad. ℥ j., tds.

*November* 18.—Taken the medicine regularly. Feels and looks well. Good colour. Ordered the mixture four times a day.

N = 3,820,000; G = ·70.

*December* 2.—Slight nausea on one or two occasions; at present feels quite well and has a good colour. Menses on November 25.

N = 3,670,000; G = ·64.

*December* 16.—The face, lips, and conjunctivæ look much paler; does not feel so well; aching in legs; dyspnœa for the last day or two. Felt rather sick the week before last. No coryza, or smarting of the eyes. Bowels regular.

N = 1,890,000; G = ·72.

She was again put on iron, and ordered Syrupi Ferri Iodid. ʒ j. tds.

*December* 23.—Feels and looks about the same. Taken Syrupi Ferri Iodid. ʒj. tds. for the last week.

N = 2,800,000; G = ·57.

*December* 30.—No menses this month. Looks and feels somewhat better.

N = 2,690,000 ; G = ·71.

*January* 27, 1882.—Menses appeared on January 1. Taken the syrup regularly. Feels very well ; good colour of face, lips, and conjunctivæ.

N = 4,820,000 ; G = ·56.

*February* 3.—Condition good.

N = 3,850,000 ; G = ·61 (numerical fall).

*February* 10.—Menses reappeared on evening of day of last examination (February 3) and lasted five days ; profuse. Feels and looks well.

N = 3,560,000 ; G = ·66 (numerical fall continues).

*February* 17.—Breath rather short during last week.

N = 4,040,000 ; G = ·61.

*February* 24.—No dyspnœa. Condition good.

N = 4,050,000 ; G = ·58.

*March* 3.—Menses expected to-day. Feels and looks well.

N = 4,620,000 ; G = ·56.

Many of the corpuscles are small ; not irregular in outline.

*March* 10.—The menses have not yet appeared. Condition the same.

N = 3,370,000 ; G = ·66 (numerical fall).

Marked absence of very small forms. Corpuscles vary in diameter between 5·7μ and 8·5μ or 9 9μ, the majority approaching the higher rather than the lower figure. One white corpuscle to about sixty red.

*March* 24.—The menses appeared three days after the last examination, on March 13, and lasted five days. Feels and looks well.

N = 3,370,000 ; G = ·70.

*March* 31.—Condition good.

N = 3,790,000 ; G = ·65.

*April* 14.—No menses yet appeared. Quite well except slight occasional nausea after the medicine.

$$N = 3{,}350{,}000 ;\ G = \cdot 59 \text{ (numerical fall).}$$

*April* 21.—Feels better; no nausea; good colour. Menses appeared on April 20 and lasted to April 26.

$$N = 3{,}170{,}000 ;\ G = \cdot 63.$$

*April* 28.—Menses ceased on April 26; less profuse. Sick two or three times after the medicine. Good colour.

$$N = 3{,}050{,}000 ;\ G = \cdot 63.$$

*Iron discontinued;* ordered a mixture containing gr. j. Quiniæ Sulph. with m. x. Acid sulph. dil.

*May* 5.—No nausea or sickness. Feels and looks well.

$$N = 4{,}260{,}000 ;\ G = \cdot 47.$$

Great increase of corpuscular number, majority between $5 \cdot 7\mu$ and $7 \cdot 1\mu$, some $8 \cdot 5\mu$, a few $4 \cdot 2\mu$; average smaller than normal. Individual value fallen.

*May*, 12.—Not quite so good a colour this week. Headache; continuous hum on right side of neck; no definite cardiac bruit.

$$N = 2{,}670{,}000 ;\ G = \cdot 56.$$

Majority about $7 \cdot 1\mu$; small forms very exceptional. The small intermediate forms, which were abundant on the last occasion, have disappeared, and consequently the individual value has risen. Large numerical fall.

*May* 19.—Dyspnœa; more pallor; inability to get about; feels weak; pains in arms and legs; appetite good; bowels regular; continuous hum, most marked on right side of neck; systolic sound on left side.

$$N = 2{,}590{,}000 ;\ G = \cdot 52.$$

Average diameter $5 \cdot 7$ to $7 \cdot 1\mu$; the majority approach the lower rather than the higher figure; many $4 \cdot 2\mu$.

*May* 26.—Menses appeared on 23rd and lasted to 27th; blood of pale colour; nausea; dyspnœa; pain in legs and arms; headache; giddiness; general feeling of malaise; lips and conjunctivæ pallid; systolic sound on both sides at base of neck; continuous hum over both external jugulars. Quinine left off; ordered a mixture of Acid Sulp. dil. and *Infus. Quassiæ.*

$$N = 2{,}610{,}000;\ G = \cdot 38.$$

A good many of the corpuscles are of diameter, $4\cdot 2\mu$ to $2\cdot 85\mu$. Very small forms abundant.

*June* 2.—Feels worse; great pallor; nausea; giddiness; severe frontal headache; pain across loins and in limbs; weakness; dyspnœa on exertion; no loss of flesh; fairly good appetite; no œdema of feet; no tinnitus; continuous venous hum over right internal jugular; systolic sound on both sides; hum somewhat continuous over left external jugular.

$$N = 2{,}270{,}000;\ G = \cdot 42.$$

Corpuscles both larger and smaller than normal are prevalent in the blood; chlorotic character pronounced.

Patient again put on iron; ordered Blaud's pills, three to be taken three times a day (each pill contained 2·5 grains Ferri Sulph. and 2·5 grains potass. carb.).

*June* 9.—Pills agree well. Looks much better; lips better colour; face and conjunctivæ still pallid; gets about better; still has pains in legs; less dyspnœa; no sickness; occasional headache. She began to feel better on the third day after commencing the medicine. No continuous hum in jugulars on either side; systolic sound in both internal jugulars.

$$N = 3{,}240{,}000;\ G = \cdot 42.$$

Great corpuscular increase. The field looked at as a whole shows corpuscles of very varying size; many are twice the size of others; small forms numerous—$2\cdot 85\mu$ to $5\cdot 70\mu$, some are $8\cdot 5\mu$.

*June* 16.—Feels and looks much better; no headache; no pain in limbs; no nausea. Taken three pills three times a day; agree well. Faint systolic over root of neck on both sides; no continuous hum.

$$N = \cdot 4{,}200{,}000;\ G = \cdot 47.$$

The average corpuscular size has decidedly increased since last week; very few under 5·7$\mu$, average size 7$\mu$ (about), some 8·5$\mu$, a few are tailed.

*June* 23.—Feels better; face still rather pale; lips and conjunctivæ fair colour; breath better.

N = 3,960,000; G = ·50.

Small forms very exceptional, average size 6$\mu$ to 7·1$\mu$.

*June* 30.—Breathing still rather short. Looks better; fairly good colour; slight systolic sound on right side of neck, none on left.

N = 3,500,000; G = ·59.

Very few small forms; average, 7$\mu$ to 8·5$\mu$ (numerical fall).

*July* 7.—Looks and feels well. Menses appeared July 1, lasted to July 4; flow less copious than usual, about the same as on last occasion.

N = 4,700,000; G - ·59.

Considerable corpuscular increase after menstruation. Many corpuscles are small, ranging from 4·2$\mu$ to 5·7$\mu$, others from 7$\mu$ to 8·5$\mu$.

*July* 14.—Slight diarrhœa during last week. Feels and looks well; good colour.

N = 3,400,000; G = ·73.

Marked absence of small forms, showing a great difference from the last examination. Average, 7$\mu$ to 8·5$\mu$.

CASE II.—Eliza B——, August 25, 1881, aged nineteen years, a general servant, admitted under Dr. Hayes, at the Royal Free Hospital.

Menses commenced at fourteen years of age, was quite regular for two years, but has seen nothing for the last three years, except on one occasion slightly, about six months ago. Occasionally sick; appetite bad; great pallor, which has been worse for the last six months; dyspnœa on exertion; feels tired and unable to do much work; lips bloodless. No treatment for some months. She was in a country hospital for three months last winter, but without much improvement. No emaciation.

℞ Ferri redacti, gr. v., tds.
Pil. Aloes. Soc., gr. v., prn.
N = 2,890,000 ; G = ·37.

*September* 1.—Feels better; is able to get about better; no appreciable improvement in appearance; dyspnœa continues.

N = 3.670,000 ; G = ·50.

*September* 8.—Feels much better; decided improvement in colour of face, lips, and conjunctivæ. The powders agree well. Bowels regular; has required no pills. Dyspnœa continues; appetite poor.

N = 4,450,000 ; G = ·58.

*September* 15.—Feels and looks better. Slight return of menses on September 11; dyspnœa slight.

N = 4,590,000 ; G = ·61.

*October* 6.—Taken medicine regularly; agrees well. Colour now very good; cheeks florid.

N = 4,860,000 ; G = ·63.

*October* 13.—Feels and looks quite well. No menses have yet appeared this month.

Patient discontinued her attendance.

N = 4,350,000 ; G = 74.

CASE. III.—Emily D——, eighteen years.

*February* 8, 1882.—Menses commenced two years ago and were quite regular for a year; stopped for four months and returned, but ceased again last August and have not appeared since. She has been getting gradually paler since August. Face at present absolutely white; lips and conjunctivæ very pallid. Dyspnœa on exertion; no œdema; no wasting; appetite bad. Continuous hum over right internal jugular; none over left; no cardiac bruit.

N = 3,730,000 ; G = ·40.

Ordered five grains Ferri et. Am. Cit., three times a day.

*February* 15.—Feels much better. Slightly better colour;

still very pale. Less dyspnœa; able to get about better. Continuous hum over right jugular.

N = 3,410,000 ; G = ·44.

*February* 22.—Better colour; still looks pale. Venous hum on right side of neck rather fainter.

N = 3,430,000 ; G = ·60.

Corpuscular diameter varies from 7·1$\mu$ to 8·5$\mu$.

*March* 1.—Very slight return of menses last night (first time for seven months). Lips and conjunctivæ fair colour; great improvement in appearance. Continuous venous hum on right side only audible on deep pressure.

N = 4,220,000 ; G = ·58.

Small forms fairly abundant, a very few about 2·85$\mu$, others 5·7$\mu$, many 7·1$\mu$ to 8·5$\mu$. Considerable numerical increase.

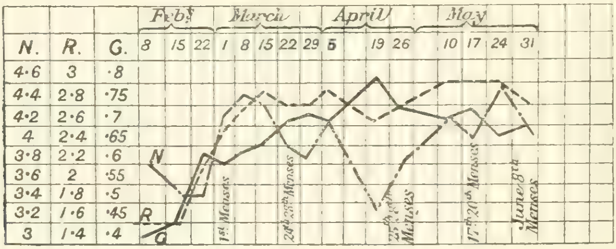


Plate II. Emily D— Case III

*March* 8.—Feels stronger and better. Less dyspnœa. Continuous hum still faintly audible on right side of neck.

N = 4,440,000 ; G = ·60.

*March* 15.—Good colour. Venous hum still faintly audible.

N = 4,370,000 ; G·64.

*March* 22.—Looks well. Faint bruit de diable.

N = 3,940,000 ; G = ·68 (numerical fall).

*March* 29.—Menses appeared on March 24 and lasted five days. Very faint venous hum on right side of neck still remains.

N = 3,860,000 ; G = ·70.

℞ Ferri et Ammon. Cit., gr. xv.
Aq. ad ℥j. tds.

*April* 5.—Condition good.

N = 4,130,000 ; G = ·68.

*April* 19.—Condition the same. Menses expected about April 23. Very faint venous hum.

N = 3,280,000 ; G = ·79 (numerical fall).

*April* 26.—Menses appeared last evening (April 25), lasted to April 28. Feels and looks well. Venous hum inaudible.

N = 3,710,000 ; G = ·72.

*May* 10.—Good colour. Medicine agrees well. Ordered, Ferri redacti, gr. v., ter die.

N = 4,230,000 ; G = ·69.

*May* 17.—Taken the powders regularly ; bowels regular. Continuous hum very faintly audible on deep pressure.

N = 4,090,000 ; G = ·71.

*May* 24.—Menses appeared on evening of last examination (May 17), lasted three days. Colour good.

N = 4,530,000 ; G = ·64.

*May* 31.—A soft blowing continuous hum can still be heard faintly over right external jugular. Good colour ; no dyspnœa.

N = 4,010,000 ; G = ·67.

Menses appeared on June 8, lasted three days. The patient now discontinued her attendance.

Case IV.—Elizabeth S——, aged 20 years.

*May* 17, 1882.—Menses first appeared three years ago, and she was quite regular for a year. The flow was copious and often recurred every fortnight. Two years ago she was frightened by a fire in the house in which she was living, and amenorrhœa came on for three months. Her appearance was the same as at present (chlorotic). She was under treatment and got well. Her sister, who was also frightened, was similarly affected, but had no amenorrhœa.

Of late both girls have been in service, have worked hard, had little or no exercise, and lived in an underground kitchen with gas burning all day. Both became very pale, and the sister has been under Dr. Baxter's care for the last seven weeks, and been treated with thirty-grain doses of the saccharated carbonate of iron. She had no amenorrhœa, and is now quite well.

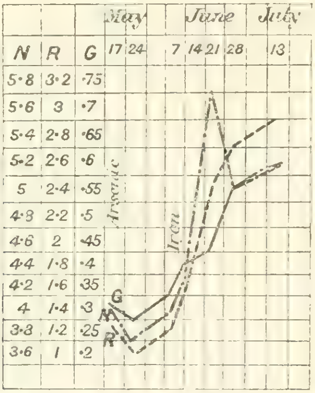


*Plate III Eliz S— Case IV*

The present case has been getting paler for the last three months, and the menses have been absent. The face is very pallid, the palpebral conjunctivæ whitish, and the lips of a very light pink colour. Loud, continuous hum on both sides of the base of the neck, and a bruit over the pulmonary cartilage. Dyspnœa for the last few weeks; inability to work; no œdema of feet.

N = 4,070,000; G = ·31.

Numerous highly refracting points are scattered through the field (hæmatoblasts). Average size of red corpuscles 5·7$\mu$ to 7·1$\mu$. A very few large, granular-looking corpuscles, from 8·5$\mu$ to 10$\mu$. The patient was given the following mixture:—

℞. Liq. Arsenicalis, ♏v.
Inf. Calumbæ, ad ℥j tds. post. cib.

*May* 24.—Taken medicine regularly. No improvement in appearance. Felt faint and weak a few days ago, slightly better for last two days. Rather less dyspnœa. Bowels regular. Appetite poor. Bruits in neck and over base of heart remain unaltered.

$$N = 3{,}760{,}000\ ;\ G = \cdot 28.$$

Average corpuscular size appears to have decreased; majority about 5·7$\mu$, some over, and a considerable number under; a few are slightly irregular in outline.

*June* 7.—Feels slightly better, less dyspnœa and aching in legs; occasional headache; no nausea or vomiting; appetite variable. Colour of face and mucous membranes remains unaltered. Loud continuous hum audible on both sides, most marked on right; cardiac bruit the same.

$$N = 3{,}920{,}000\ ;\ G = \cdot 33$$

Majority of corpuscles of fair size—5·7$\mu$ to 7·1$\mu$, or slightly larger. Very small forms are uncommon.

The arsenic has been taken regularly for three weeks, but has produced no improvement either in the absolute colour or number of the red discs.

She was now placed on five-grain doses of reduced iron three times a day.

*June* 14.—Colour slightly improved; felt better for last two or three days; less weak and faint; less dyspnœa. Powders agree well. Continuous hum both sides of neck; systolic bruit to left of base of heart.

$$N = 4{,}350{,}000 :\ G = \cdot 40.$$

The corpuscles as a whole look unequal. Considerable increase of small forms. Majority about 5·7$\mu$ or under. Many 4·3$\mu$ and some still smaller (3$\mu$). Some large and granular-looking (8·5$\mu$ to 9$\mu$).

*June* 21.—A better colour; lips and conjunctivæ a fair colour. Less dyspnœa; feels stronger. Continuous hum audible on left side of neck; but only occasionally and with difficulty on right. A systolic sound over right internal jugular. No basic bruit can be heard.

$$N = 5{,}780{,}000\;;\; G = \cdot43$$

Small forms abundant, some slightly tailed. Corpuscles look unequal in size; majority about 5·7$\mu$, many 7$\mu$; some large and granular-looking forms.

*June* 28.—Looks and feels very much better. Face rather flushed; good appetite; no continuous venous hum: systolic sound audible on both sides at root of neck. Faint bruit over pulmonary still audible.

$$N = 4{,}990{,}000\;;\; G = \cdot54.$$

Majority of discs about 5·7 or 6$\mu$, many 7$\mu$. Small forms fairly abundant—some 3$\mu$ to 4$\mu$—a few slightly tailed.

*July* 13.—She has improved very much in appearance during the last fortnight; now looks very well; good appetite; no dyspnœa; gets about well. Menses returned five days ago, lasted for four days (first time since January last). No continuous hum on either side of neck; no cardiac murmur.

$$N = 5{,}110{,}000\;;\; G = \cdot58.$$

Small forms still fairly numerous, 3$\mu$ to 4$\mu$, average about 7·1$\mu$.

CASE V.—Lizzie C., aged eighteen years.

*February* 20, 1882.—Menses first appeared about two years ago, and were at first regular for two or three occasions, then became irregular, and for the last six months there has been complete amenorrhœa. She has been very pale for two years, but has become much worse during the last nine months; subject to occasional fits, apparently hysterical, since age of sixteen. At present very chlorotic; with dyspnœa, headache, and palpitation. No œdema of feet. On the right side of the neck a double, roughish murmur, chiefly systolic, can be heard, but no continuous bruit de diable. A continuous hum is audible on the left side. No cardiac murmur.

N = 3,870,000 ; G = ·34.

The corpuscles are of good shape and fair size.

℞. Tr. Ferri Perchlor. ♏x.
Aq. ad ℥j. tds.

*February* 27.—Feels better. Still looks very pale, but thinks her colour has very slightly improved. Less dyspnœa. Continuous venous hum on left side of neck as before; none on right; no cardiac bruit.

N = 4,460,000 ; G = ·32.

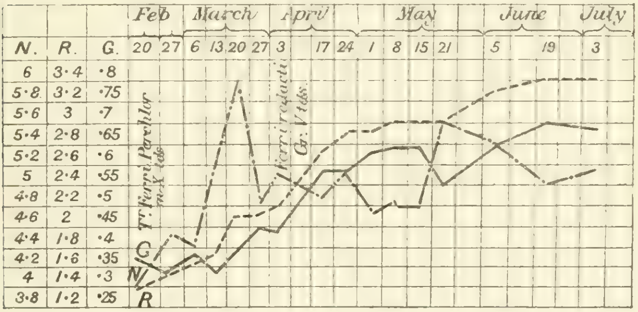


*Plate IV Lizzie C— Case V*

Small forms are more abundant, and the corpuscles are more distorted than on the last occasion. Some few corpuscles are large and granular, and upwards of 10$\mu$ in diameter; many are about 3$\mu$ or under; the majority vary from 5·7$\mu$ to 7$\mu$.

*March* 6.—Still looks very pale. Pain after food; no sickness. Bruits in neck continue the same. Little or no improvement.

N = 4,360,000 ; G = ·35

Corpuscles look unequal when viewed as a whole; very few are tailed.

*March* 13.—Slight swelling of legs, headache, pain in limbs, feeling of faintness, still looks pale; lips are a better colour than at first; bruits in neck continue unchanged.

N = 5,180,000 ; G = ·31.

*March* 20.—Feels better this week ; still looks pale. Continuous venous hum faintly heard on left side of neck, not audible on deep pressure. A systolic and diastolic sound (not blowing or continuous) can still be heard on right side.

N = 5,850,000 ; G = ·35.

*March* 27.—Feels and looks better ; still pale. Venous hum on left side of neck seems rather louder. Appetite poor. No sickness.

N = 4,690,000 ; G = ·44.

The corpuscles on the whole are small ; average size about 6$\mu$, a few 7$\mu$.

*April* 3.—Feels and looks a good deal better. Lips and conjunctivæ more coloured. Vertigo occasionally. Poor appetite. Venous hum the same. *Ordered Ferri Reducti, gr. v. ter die.*

N = 5,030,000 ; G = ·42.

*April* 17.—Slight return of menses on April 5. Looks better. Venous hum still audible, especially on deep pressure.

N = 4,810,000 ; G = ·56.

Considerable increase in colour.

*April* 24.—Breath rather short ; feels better. Venous hum on left side of neck feeble. No bruit on right side.

N = 5,020,000 ; G = ·56.

Average size 6$\mu$ to 7$\mu$. Some few 8·5$\mu$. Small forms fairly numerous.

*May* 1.—Lips and conjunctivæ a good colour ; feels well. Venous hum on left side rather louder ; a systolic sound can be heard on right side.

N = 4,620,000 ; G = ·60.

*May* 8.—No menses. Appearance unaltered ; bruits about the same as last week. Slight sore throat and mouth.

N = 4,730,000 ; G = ·61.

*May* 15.—Not felt very well, nausea, pain epigastrium. Bowels regular ; poor appetite. Appearance unaltered, fair colour of lips and conjunctivæ. Bruits still audible in neck. The powders (Ferri Redacti) probably disagree.

℞. Ferri et Am. Cit. gr. x., Aq. ad ℥ fs. ter die.

N = 4,730,000; G = ·61.

*May* 21.—Medicine agrees well. Feels and looks better. No epigastric pain. No menses. Bruits unaltered.

N = 5,520,000; G = ·52.

Considerable increase in number: small forms fairly abundant, varying from 3$\mu$ to 6$\mu$. Majority about 7$\mu$. Some 8·5$\mu$.

*June* 5.—Very slight return of menses on May 23, lasted about two days. Had two fits (hysterical) last week. Venous hum still audible on left side.

N = 5,310,000; G = ·61.

Iron omitted and ordered gr. x. Pot. Bromidi, ter die.

*June* 19.—Feels better. Bruit on left side can still be heard. Good colour of mucous membranes.

N = 4,960,000; G = ·68.

Average corpuscular diameter about 7$\mu$. Small forms absent. There has been a slight but decided increase in the total colour since the iron was omitted on June 5.

*July* 3.—No menses. Slight dyspnœa; pain after food; poor appetite. Good colour. Venous hum slight on left side of neck.

N = 5,070,000; G = ·66.

The menses in this case were never thoroughly re-established, and amenorrhœa continued when she was again seen in October. No relapse had occurred up to that time. She took an iron preparation occasionally but not continuously.

Case VI.—Julia P., aged sixteen years.

*August* 17, 1881.—The menses appeared two or three times, but have ceased for the last two months. Previously she had a good colour, but has become pale since menstruation ceased. Very pale at present; appetite good; faints occasionally; no loss of flesh. Bruit de diable in neck. No cardiac bruit. Not lived well for the last two months.

℞. Tr. Ferri Perchlor. ♏ vij.
Aq. ad ℥ ſs., ter die.

N = 2,580,000 ; G = ·49.

*August* 22.—Feels better. Dyspnœa on exertion. Good appetite.

N = 2,840,000 ; G = ·45.

*September* 5.—Slightly better colour; feels better; less dyspnœa.

N = 3,110,000 ; G = ·43.

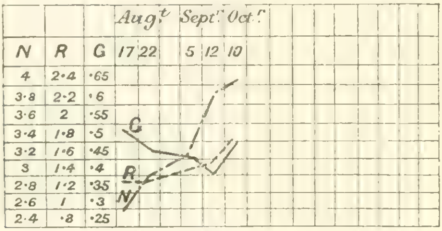


*Plate V. Case VI Julia P—*

Ordered Blaud's pills (two and a half grains of sulphate of iron in each) three a day.

*September* 12.—Taken the pills irregularly. No menses. Colour about the same. Occasional dyspnœa.

N = 3,830,000 ; G = ·37.

Ordered two pills three times a day.

*October* 10.—Pills taken irregularly ; none for some days during the last month. Looks better ; decided improvement in colour, but still looks anæmic. No menses.

N = 3,950,000 ; G = ·45.

The improvement in this case is chiefly in the increase in the number of corpuscles. Iron had been taken very irregularly, although a large dose was ordered during the last month.

(*To be continued.*)

# TREATMENT OF ULCER OF THE STOMACH.

BY F. P. ATKINSON, M.D.

I THINK there can be no doubt that an immense amount of important and accurate knowledge may often be gained from the study of chronic disease, or from the frequent recurrence of the same malady in the same individual, and two or three cases that have come under my notice during the last few years, have impressed this upon me very forcibly. One case of gastric ulcer, (diagnosed as such by four or five independent medical men,) has been under my care on four separate occasions, and each time, she has received almost immediate benefit from the treatment adopted, though she said she had not experienced any relief from what had been previously prescribed. I found she had taken carbonate of iron, carbonate of soda with bismuth, prussic acid and calumba, bismuth, strychnine, and pepsin, effervescing citrate of potash with Schacht's solution of bismuth, and various sedatives, with a diet of beef-tea, mutton-broth, barley-water, milk and lime-water, but without there being any change in her general condition. The tenderness, the pain, the vomiting continued unchanged, and the last time I was called in to see her she said she felt so weak that she was scarcely able to stand. She was exceedingly thin, and with the exception of a flush upon her cheeks, she had not a particle of colour either in her face or lips, and her pulse was quick and thready.

On each occasion I ordered complete rest in bed. A teaspoonful of Brand's liquid essence of beef, or a teaspoonful of Valentin's meat juice in a little cold water, in small quantities every four hours; a wineglassful of milk and lime-water (mixed in equal proportions) to be taken frequently, and the body to be rubbed with olive oil morning and evening. The beef essence and milk were very gradually increased, and when the pain had almost subsided a little sponge cake, bread, barley-water, arrowroot, &c., were allowed, and at last, by very slow degrees, ordinary food replaced the liquid diet. Stimulants of all kinds were interdicted.

The medical treatment consisted of:—

8 grains of Tartrate of Iron,
15 minims of Tincture of Conium,
15 minims of Tincture of Calumba,
15 minims of Glycerine,

in one ounce of water, three times daily.

No aperients were allowed. After a time the mixture was replaced by 15 minims of Bravais dialysed iron, three times a day. Since the last attack, about a year ago, the patient has very materially gained in flesh and colour, has been able to take the ordinary diet, except for two or three days, and can walk four or five miles without fatigue.

P.S.—Since writing the above she has had another attack of vomiting, when liquor potassæ had to be given for a day or two first, and koumiss seemed to agree better than the milk and lime-water.

# ACUTE PNEUMONIA.

BY THOMAS F. RAVEN, L.R.C.P.

In the following article no detailed account of acute pneumonia is attempted. A few points only are referred to in relation to the nature of the disease, its symptoms, and its treatment. By the term *pneumonia* is implied, not merely the local inflammation of the lung, but also the altered constitutional conditions attending the disease. Croupous or lobar pneumonia is, for the most part, referred to, and not the catarrhal or disseminated form, although it is certain that no clear boundary line can be drawn between them. With one exception, the cases related occurred in otherwise healthy subjects.

Without disputing that the suspended function of the lung in acute pneumonia may sometimes have much to do with the prospects of recovery, it may be asserted that the inflamed state of the lung is not of the supreme importance that it has sometimes been supposed to be—that the local pulmonary conditions, instead of being the cause of illness, are but the phenomena of some previously morbid state of the body, of shorter or longer existence, however induced, whether by chill, infection, remote bodily injury or shock, or want of food. To put it briefly, it may be argued that a man is not ill because he has an inflamed lung, but that he has an inflamed lung because he is ill. There are several reasons for thus regarding pneumonia as a fever characterised by inflammation of the lung, as measles and small-pox are fevers characterised, the one by catarrh, the other by pustular rash.

In support of this view it is worthy of remark, first, that, like other fevers, pneumonia runs a definite course, marked by several stages, and that it has a strong tendency to terminate by crisis. Then, cases are recorded where the general symptoms of the disease have preceded, by some days, the local manifestations in the lung. Next there is the fact that the fever and general symptoms are often quite disproportionate to the amount of lung-tissue involved. In children, for instance, it is common to find the evidences of inflammation limited to a mere scrap of lung, while the temperature is as high and the general disturbance as severe as when a whole lobe is attacked. Again, the inflammation of the lung in pneumonia differs in several ways from that which results from injury—wounding of the lung, for instance. Traumatic lung inflammation runs no definite course, has no crisis, and the exudation, if any, is interstitial and not alveolar, resembling a limiting fibrine. The conclusion that pneumonia depends upon something more than an inflamed lung, is strengthened by these distinctions. Lastly, when the disease has reached the critical point, the constitutional symptoms and the lung affection hold no parallel course. A man may have on one day a pulse of 120 and a temperature of 103°. In his lung bronchial breathing may be heard, and the percussion note may be dull. In the course of the next thirty-six hours or so his pulse may have fallen to seventy or sixty, and his temperature to 98° or lower, the physical signs in the lung remaining unaltered. In such instances, which are very common, it cannot be said that the improved state of the patient depends upon an improved state of his lung; indeed, the more completely the alveoli of the lung are blocked with exudation, the nearer seems the prospect of recovery. These observations suggest further that so far from the inflammation of the lung in pneumonia being the cause of the fever, it may, on the contrary, be the channel through which the disease disappears; and that the exudation into the air-sacs—which, after all, is its main characteristic—may be the vehicle by which the *materies morbi* is eliminated.

The communicability of pneumonia has also some bearing upon the question, but it is possible that this feature of the disease has been exaggerated. Enteric fever was formerly supposed to be very catching, because it was often observed that several individuals would be attacked, one after another, in the same house, and it was assumed that the disease was communicated by one person to the others. It is well known now that this form of fever is in a very slight degree communicable, and that what used to be looked upon as contagion was really the existence of a general cause of the disease—escape of sewer-gas or contaminated drinking-water. In the same way it is possible that the causes of pneumonia have sometimes been confused, contagion being supposed to exist when there have been general influences at work. For it is usually where the sanitary state of a house is bad, and where, therefore, so-called "pythogenic" pneumonia might not improbably occur, that these communicable cases are met with. For instance, three cases of very severe pneumonia recently occurred under one roof in rapid succession. The disease was said to be contagious, but at the same time the drainage of the house and neighbourhood was admittedly bad and pneumonia was prevalent. Again, a great deal of pneumonia appeared in a gaol in Germany. The disease assumed a severe and characteristic type, and the sanitary state of the gaol was very bad. Yet these cases are published as instances of contagious pneumonia. They may have been so, and it is quite likely that the pythogenic form of the disease is more catching than that of the more ordinary kind. But it would be useful to get some approximate idea as to how much is due to contagion and how much to septic influences. Perhaps the disease, even in its simpler form, may be communicable. Cases are on record where, under apparently favourable sanitary conditions, pneumonia has spread from one person to others, those only being attacked who have frequented the sick room. The following case seems to be an instance of the kind :—An old man, living in a small and ill-ventilated room, had acute pneumonia, of which he died. His wife nursed him and had the disease a week later than her husband. She presented nearly similar symptoms, but recovered. No insanitary state of things could be discovered to account for the illness. It appeared likely that the smallness of the room and the consequent want of air had something to do with the promotion of contagion. The doctrine of contagion in pneumonia is corroborated by the undoubted communicability of pleuropneumonia in cattle.

Although pneumonia often and indeed generally makes a remarkably uniform progress through its various stages, it by no means so frequently exhibits regularity in its symptoms. On the contrary, there is, perhaps, no acute disease so often wanting in its typical features. There seems to be but one symptom of invariable occurrence, namely, pyrexia. All temperature charts show that a rise of the bodily heat is an invariable as it is a necessary accompaniment of the disease. But of the other distinctive symptoms each and even many may be absent. It is rare that rigor (or convulsions in young children) is not met with, and it is difficult to disprove its occurrence. But there are certainly cases without it. Painless pneumonia is not very rare, especially when the apex is attacked, and the inflamed lung and pleura, therefore, subjected to but little thoracic movement. Headache is common, but not constant. Cough is not always found, but, if the mucous membrane of the bronchi be involved, it is sure to occur, as also it must when any of the exudation into the lung is expectorated. But sometimes there are no sputa, and this is sometimes the case when sweating is profuse. Quickened respiration, even, is not always met with. As an instance of the normal pulse which may accompany acute pneumonia, the case of a man may be mentioned, whose pulse throughout his attack did not exceed seventy-two, although his temperature rose to 103°. He sweated freely. Physical signs also in some instances are long delayed, and in others they may not exist, on account of the inflammatory process attacking deep-seated, central portions of the lung. Sometimes, too, there may be peculiar difficulties in detecting them. The patient may be so weak that physical examination cannot be borne; or, in the subjects of angular curvature, the distortion of the chest may be so great as to throw additional difficulty in the way of the auscultator. Notwithstanding all these difficulties and all the irregularities of its symptoms, acute pneumonia is a disease that can scarcely ever be overlooked.

The following is a good example of the misleading symptoms that may sometimes be met with. The patient was a little boy, six years of age, who had just passed half a pint of clear blood by the bowel. He had a high temperature, rapid pulse, sickness, constipated bowels, and a distended, painful, and tender abdomen. He had no pain in the chest, cough, or expectoration, or headache, nor was his respiration hurried. Attention was thus drawn to the intestines, and the lungs were overlooked. The case, however, was one of pneumonia of the right upper lobe. This was quite certain when, at the next visit, the chest was examined. Still the respirations were carefully noted to be of natural frequency, although the pulse was 130, and to the end of a severe attack there was neither pain, cough, or expectoration. Instances of acute pneumonia with erratic symptoms might easily be multiplied, but it will be enough to mention one more case—that of a man who, beyond *malaise*, complained of nothing but severe headache and pain down the right arm. The physical signs were unmistakable, and the fever and crisis well marked. The respirations here again were only nineteen in the minute, and the pulse did not exceed seventy. Here, too, there was most profuse sweating—a symptom which often appears accountable for irregularities in pneumonia.

Statistics of pneumonia show that in hospital practice the base is found to be much more frequently attacked than the apex. In general practice, however, it will be found that pneumonia of the apex is as common as that of the base. This difference it is easy to adjust. The explanation lies in the fact that young children, in whom apex pneumonia is very common, are not admitted into general hospitals. Pneumonia of the apex commonly occurs, also, among drunkards, and in those individuals who have been exposed to insanitary surroundings. The frequency with which the apex is attacked in these three classes of patients may help to explain why it is that delirium is so often associated with inflammation of this part of the lung. For the brains of children are prone to be easily disturbed; drunkards, *à fortiori*, readily become delirious; and when septic influences give rise to pythogenic pneumonia, the prominence of delirium may be expected. Hence, too, in adults when delirium is strongly marked or occurs early, the prognosis is unfavourable.

But however frequent the affection of the apex may be, pneumonia beginning in the base is generally regarded as the typical form of the disease. Basic pneumonia usually runs a more regular course than that of the apex, and its prognosis, therefore, in adults, is more favourable. It is in the bases of the lungs that double pneumonia is commonly situated. This form of the disease is rare, but dangerous. The system in such cases, more than in any others, suffers from the interrupted function of the lungs and becomes self-poisoned.

In whatever part of the lung the inflammatory action may begin, it has a tendency to spread, but is often limited by the fissures which divide the lungs into lobes. In children, several lobules may be affected in separate positions. The right lung is said to be more frequently attacked than the left;[1] but it is the larger of the two.

In pneumonia, then, the inflammation of the lung is generally localised in one or other of these ways; but there is a rare form of the disease, where the inflammatory action has no fixed position, but changes its seat with more or less rapidity. The following case is an example of this form of pneumonia. A man, aged twenty-eight, of very intemperate habits, having suffered for some weeks from catarrh, was seized with rigors and presented the symptoms of pneumonia of the left apex. In thirty-six hours the physical signs had disappeared from this apex, but there was a patch of dull percussion and tubular breathing in the right base. These evidences as quickly vanished, but again the inflammatory action asserted itself, and now in the left base. With each of these changes there seemed to be some temporary improvement, but the general condition was one of asthenia, delirium and diarrhœa being marked features. Not only his intemperate habits, but the state of this patient's urine gave the clue to these grave appearances. In boyhood he was said to have been the subject of diabetes insipidus, and on examination the urine, which was scanty, was found to be of sp. gr. 1,000 and non-albuminous. He died on the sixth day of the disease, dating from rigor.

Trousseau recognises this form of pneumonia, and he relates a case in which the inflammation, beginning in a small spot, gradually invaded a whole lung, being arrested at times in its course. He calls it "phlegmono-erysipelatous" pneumonia, from the resemblance that he traces between its mode of progress and that which is seen in phlegmonous erysipelas of a limb. The case related above is a strong one in point; for not only did the inflammation change its seat, but it actually leapt from one lung to the other, in a way equally resembling the mode of progress in some forms of erysipelas. It is not at all uncommon to meet with instances where inflammation spreads, gradually or rapidly, in the lung, nor are such cases necessarily unfavourable. But there is an important distinction to be drawn between them and cases such as that which has just been described. The distinction lies in the behaviour of the portion of lung first attacked. In ordinary cases this goes through the usual inflammatory processes, but in the "erysipelatous" form of pneumonia, the portion of lung first affected undergoes rapid resolution (exudation being incomplete), while the inflammation spreads beyond it. This is, perhaps, the worst kind of pneumonia, and is only met with in persons of depraved constitution. Such cases support a suggestion already made in this paper, that the favourable termination of pneumonia may be owing to adequate exudation. Exception has been taken to the term "erysipelatous" pneumonia, inasmuch as the association of the disease with erysipelas is very rare. But this "erysipelatous" pneumonia itself is also very rare. Perhaps, however, Trousseau meant to point to a similarity to, rather than to insist upon a strict analogy with erysipelas in such cases.

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[1] Watson.

"Pythogenic" pneumonia appears to occur with varying intensity. Some observers describe it as a violent and dangerous form of the disease, distinguished by the irregularity of its symptoms and frequently accompanied by pleurisy with effusion, intestinal congestion, and a delirium resembling *delirium tremens.* Sometimes, however, the symptoms are milder, and the physical signs reveal congestion rather than consolidation of the lungs, both sides being often involved. The nocturnal exacerbations and morning remissions of temperature are said to be strongly marked in the pathological form of pneumonia.

The crisis of the disease, when the issue is favourable, occurs most frequently about the sixth day, dating from rigor. But it takes place sometimes a good deal earlier than this. A little girl who had pneumonia of the apex and in whose case the history of rigors was clear, was recently under treatment. The temperature fell, suddenly, early on the fourth day of the complaint. Resolution was, comparatively, equally rapid. Crisis is, however, even in favourable cases, often delayed beyond a week. When the inflammation gradually spreads in a lung, the crisis cannot be expected so soon as when the attack limits itself to the portion of lung-tissue involved from the first. Also, when the symptoms are more than usually severe, the crisis is apt to be delayed. But there is cause for anxiety when the temperature keeps up for more than ten days. A sudden surrender of the disease is a much more common event than its gradual subsidence.

The duration of the stage of resolution is a very indefinite matter. Ten days after crisis may be guessed as an average time for the total disappearance of physical signs in favourable cases. It is more tedious in catarrhal than in croupous pneumonia, and occupies more time with old people than with young; and it is of course much influenced by pleuritic effusion. During this stage, while absorption of the disintegrated products of inflammation is going on, and, presumably, in consequence of this process, it is not very uncommon to meet with a temporary rise of the bodily heat with some unimportant general disturbance. Acquaintance with this fact will prevent its occurrence from being too seriously regarded. In the stage of resolution, the most lingering of all the physical signs is often that which is called *crepitatio redux.* It may remain audible for days and days after all other symptoms have vanished. It may be explained by the existence of the remains of viscid exudation on the walls of the remoter bronchules and air-sacs. The sound is often like the earlier crepitation, only larger.[1] But it differs from it also in this way: Whereas the small crepitation of early inflammation is heard during each inspiration, this latter sound is heard at the end of deep inspiration only. After a full inflation of the lung it is inaudible for some minutes, however deeply the patient may breathe. But after a little while, when the walls of the air-sacs and bronchules, which have been separated by forcible inspiration, are again sticking together, the sound may be heard once more.

Temporary jaundice, and temporary albuminuria, are sometimes met with as complications of pneumonia. Neither of them seems to be of serious importance. They are said to be consequent, the one upon hyperæmia of the liver, the other upon the same condition of the kidneys. Pneumonia would seem to be a sequel of pericarditis, rather than pericarditis of pneumonia. Labial herpes is found, as a rule, in favourable cases.[1]

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[1] "It certainly does not remind one of minute crepitation."—Sturges on *Pneumonia.*

In otherwise healthy, temperate, well-nourished subjects, pneumonia ends satisfactorily in a large majority of instances. Children scarcely ever die of it. There does not appear to be ground for an unfavourable prognosis when the patient has a tendency to phthisis, even though the latter disease be in progress. The prospect is far otherwise in the case of drunkards. In those who have suffered from want of food the prognosis is also grave, rapid purulent infiltration of the lung being a frequent event in "starvation pneumonia."

Abscess of the lung is an exceedingly rare result of idiopathic inflammation. In cases of wounded lung it is not so uncommon. Niemeyer says that it is never met with in the croupous form of pneumonia, and Dr. Sturges, in his able and most readable work, states that it is not one of the events of the disease. The following case, at the time of its occurrence, appeared to be an example of abscess of the lung. But if, in croupous pneumonia, this be a pathological impossibility, then the case must be called one of empyema, limited to the upper part of the pleural cavity by adhesions lower down, and finding vent through the serous membrane and air-sacs, by the bronchi. A delicate young lady had pneumonia of the right upper lobe. The disease was distinctly of the croupous or lobar form, the attack being sudden and severe, and unattended by cough or sputa. The expected crisis was very feebly marked, and pyrexia was almost immediately renewed, but without fresh rigors. The upper lobe showed the signs of hepatization for more than three months. At the end of this long time there occurred a sudden expectoration of some colourless mucus. This was followed by pus, a copious discharge of which lasted for several hours and then ceased entirely. Recovery soon followed. It is worth noting that though this collection of pus existed, the temperature remained normal for weeks. But the pulse kept up, varying from 110 to 120, and did not return to its natural frequency until the pus had been got rid of.

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[1] Dr. Hare.

When gangrene ensues upon pneumonia, it cannot, of course, be mistaken. It is attributed, by some, to a previously existing unhealthy constitutional condition; by others, to pulmonary collapse; and records of post-mortem examinations show that it has occasionally resulted from plugging of the pulmonary or bronchial arteries by fibrinous deposits. Gangrene takes place chiefly among children, and is not necessarily fatal.[1]

The treatment of pneumonia must be influenced by the view taken of its etiology and nature. With those who regard it simply as a local inflammation, running no definite course, the object will be to arrest its progress; and, to this end, blood-letting, antimony and mercury, formerly; and aconite, veratria, ergot and other drugs, more recently, have been employed with more or less doubtful success. But those practitioners who see, in pneumonia, an affection resembling a specific fever, making uniform progress by well-defined stages, to crisis, and through resolution tending to recovery, will have a less ambitious end in view. To them it would seem to be as useless to attempt to cut short pneumonia as to stop enteric fever. They will be content, in the early stages, to place their patients under generally favourable conditions and to watch the progress of the disease. They will deal not so much with pneumonia as with cases of pneumonia. At times, the disease may be found to present such favourable and regular symptoms that intervention may be unnecessary, or, at the most, it may be enough to promote a vicarious action of the skin and kidneys. At other times severe and exceptional cases may be encountered, demanding exceptional treatment. These latter principles appear to be founded upon a juster conception of the nature of the disease, and a more accurate calculation of the possibility of rendering help than are the bolder attempts to arrest the complaint. A few years ago the writer employed aconite freely. But the results were disappointing and led to the abandonment of its use. The drug was never given unless the disease was caught in quite an early stage. One drop of the tincture was given every ten minutes, for an hour, and then the same dose, every hour, for four and twenty or thirty-six hours. It appeared, to some extent, to reduce temperature and to modify symptoms, but the disease was never seen to be arrested by its administration. In the long run, the patients were none the better for taking aconite; on the contrary, it appeared to determine an irregularity in the course of the disease, and all irregularities are bad. Veratria, ergot, and other drugs, have been employed to arrest pneumonia, but evidence is at present wanting as to their value. Not only the remedies already enumerated, but the salicylates of soda and potass, quinine and digitalis, have been employed to reduce pyrexia, and doubtless with effect. Wet packing also, and the cold bath, are recommended on the same grounds; and if reduction of temperature, transient or otherwise, prevents the destruction of tissue without producing any counterbalancing evil, all these procedures may have their value. But it must be remembered that the process of exudation has to be effected, and that this can be no more carried out without the production of heat, than can any other force be employed without the same result. Indiscriminate blood-letting, and indiscriminate brandy giving, have both had their day and have given place to more reasonable measures. Many hold that, in severe cases, moderate bleeding or dry cupping and the administration of small doses of antimony, early in the course of the disease, exercise an alleviating influence over it. Brandy or wine may be useful, in the earlier stages, as aids to digestion, but stimulation is chiefly required later, when there is great prostration of nervous power and when failure of the circulation is threatened. Under such circumstances, the employment of brandy and bleeding together may be more apparently than really inconsistent. In catarrhal pneumonia, especially, when there is engorgement of both lungs, and a threatened *stasis* of the blood, it is possible that a failing heart may, by these means, be better stimulated to renewed action, when some relief is afforded to the overloaded vessels in the lungs. At such times quinine and digitalis, as nerve and heart tonics, may be of great value. In the treatment of drunkards it is sometimes found necessary to support the flagging nervous power by wine or brandy, and by these means the temporary danger may be tided over. But the employment of stimulants with such persons is far less satisfactory than it is with those of temperate habits. When drunkards have carried their excesses to such lengths as to induce epileptiform convulsions or *delirium tremens*, the effect of brandy seems to be directly depressant. From such unfortunates even this slender chance is taken away.

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[1] Dr. Thorowgood.

For local pain, local remedies, such as poultices and fomentations (provided they are not allowed to get cold before removal) frequently applied, are to be much preferred to anodynes and narcotics. The effect of opium and morphia may be reasonably dreaded, not only from their tendency, together with the already imperfectly oxygenated blood, to produce coma (especially when there is albuminuria), but also on account of their influence in checking secretion and expectoration, and diminishing appetite. The occasional employment of opium or morphia may be required to procure sleep when this is urgently needed. For such a purpose chloral cannot be depended upon so well. Its effect is very uncertain, and the sleep produced by it is often very soon over. Blisters appear to be worse than useless.

Hyperpyrexia in acute pneumonia is said to be always associated with a condition of the lung necessarily fatal. The cold bath is advocated in such desperate cases, but in the recorded instances of recovery, the patients are admitted to have taken large quantities of brandy. Hence the value of the cold bath, under such circumstances, remains hypothetical.

When hepatization has persisted beyond the usual limits, the exhibition of the hypophosphites of soda or potass is strongly recommended. In the writer's experience the results are very disappointing, nor has any better effect followed the giving of iodide of potassium and the inhaling of iodine. In such cases, where there is no history of an hereditary tendency to phthisis, and after other remedies have failed, a course of mercury might be tried, with great caution lest the lung should break down under its influence. A sea voyage south may be of great value in procuring resolution of a long-hepatized lung.

# Reviews.

*Die Aetiologische Therapie und Prophylaxis der Lungentuberculose.* By Dr. HANS BUCHNER. Munich and Leipzig: R. Oldenbourg. 1883.

ACCEPTING the views as to the bacteric nature of tuberculosis, the author points out that in all bacteric diseases there is a struggle for existence between the micro-organisms and the cells of the living body. The resisting power of the cells may be increased in various ways and the agents which do so are called by him "dynamic agents." The occurrence of inflammation in a part, in his opinion, is an obstacle to the spread of bacteria, and one experiment is mentioned in support of this view. The injection of putrid meat-infusion into a rabbit's ear, after ligature of the carotid, leads in thirty-six to forty-eight hours to gangrene of the ear, the growth of the bacteria being enormously rapid. If, however, a line of inflammation be produced across the ear by the introduction of a seton dipped in putrid meat-infusion, the gangrene caused by subsequent injection of the putrid fluid at the tip of the ear does not spread beyond this inflamed line. Various substances which, applied in excess, cause inflammation ought in Buchner's opinion, when introduced in smaller quantities, to exercise a dynamic action and increase the resisting power of the cells to the development of micro-organisms. Chief among such substances he places arsenic, antimony, and phosphorus, and Wegner's experiments on the action of small quantities of arsenic and phosphorus are cited, as well as the well-known facts as to the arsenic-eaters of the Stein Tyrol. The main part of the work is devoted to the consideration of how arsenic *ought* to act in phthisis; the author's views being almost unsupported, however, by any clinical facts observed by himself. In fact, the trial which he has given of the treatment has been far too short to enable him to come to any conclusion as to its value, but nevertheless, so enamoured is he of his theory that he has not hesitated to add another large volume to the large mass of literature on this subject. It is surprising that the author is apparently unacquainted with the fact that in this country at any rate, the treatment of phthisis by arsenic has been advocated, tried, and abandoned as of little more benefit than that by any other remedy which improves the general health and digestion of the patient for a time.

*Lectures on Cataract, its Causes, Varieties, and Treatment.* By GEORGE COWELL, F.R.C.S. London: Macmillan and Co. 1883.

THIS little work is made up of six lectures, originally delivered to the students of the Westminster Hospital. It has for its object to discuss the chief methods and modifications which have been introduced for the operative treatment of cataract. The first and second lectures are devoted to the forms, causes, and varieties of cataract. In the third Mr. Cowell begins the consideration of its treatment. He refers to the operation of couching, in regard to which he speaks in most disparaging terms. "Fifty per cent," he observes, "are lost, and permanent success is rare." We do not quite agree with this. There are, as he admits, a certain number of successful cases, and the question rather is, whether by judicious selection of cases good averages might not oftener be obtained. There are many old people, we fancy, whose eyes will not bear the serious injury inflicted on them by the ordinary operation for cataract, but who might yet obtain good vision for the few remaining years of their life after the operation of couching. We should not be surprised, if the operation were soon reintroduced, of course from Germany, with a startling array of statistics, in which the successes were greatly in excess of the failures. The description of the various operations for the extraction of cataract, as given by Mr. Cowell, is, as we might expect from one who has so frequently operated, accurately and concisely given. Those who wish to know the phases and modifications of cataract operations, which have been so numerous of late years, cannot do better than read Mr. Cowell's book.

# Clinic of the Month.

**Aspiration of the Heart.**—Dr. C. L. Dana reports two cases in which he aspirated the right ventricle with no effect. Dr. Dana does not consider puncture of the right ventricle a difficult or even very dangerous operation. He would not advise aspiration of the right auricle under any circumstances. Not because it is necessarily dangerous, but physiologists are agreed that the auricle is chiefly a regulator and reservoir, not a propelling muscle. Unloading it could have little effect on the work of the heart. Cardiac aspiration may be indicated in cases of sudden heart-paralysis, when the ventricle is presumably over-distended. The needle may possibly relieve over-distension, and by its irritation set the heart to work again. In cases of labouring heart, however, Dr. Dana would vastly prefer venesection, whose potency is unquestionable. (*New York Medical Record*, Feb. 3, 1883.)

**The Treatment of Leprosy.**—Surgeon-Major Peters has contributed to the *Edinburgh Medical Journal* (March, 1883) the results of his experience in the treatment of this dire malady at the Leper Asylum at Belgaum during two years. The treatment may naturally be considered under two heads, viz.: 1. *Local Applications.*—For the ulcerated parts an emulsion of gurjun oil is most strongly recommended. Dr. Peters claims for it that under its use the ulcers heal rapidly, and that the cicatrices never give way when once formed; that by its use the skin is kept soft, and cracking prevented. Moreover, flies avoid people who are using this ointment. Failing this, he recommends carbolic oil (one in forty), but it is more expensive, and not so efficacious in healing the ulcers. For the tubercular form of leprosy Dr. Peters considers that we have a potent remedy in the cashew-nut oil, the application of which to the tubercles causes them to soften and break down into ulcers. These are then to be filled with gurjun oil. When they are healed over, if there is any thickening left, the whole process should be repeated. In the anæsthetic form the cashew-nut oil may also be used, being spread over the affected areas.

2. *Internal Remedies.*—Chaulmoogra oil would seem to be almost a specific, for not only does it alleviate the dyspeptic symptoms so commonly present, but it also causes absorption of the tubercles. Iodide of potassium was found useful in cases where there was reason to suspect association with syphilis. In regard to diet, the patients should be well fed, and have fresh meat, fresh fish, and vegetables. Salt meat and salt fish should be most rigorously shunned, although in none of his patients could the disease be attributed to the use of salt fish as an article of diet. It would appear that grain is often damaged by damp after being stored up in granaries, and Dr. Peters considers that this unwholesome grain is quite as capable as unwholesome fish of giving rise to leprosy. In several of his patients the disease was distinctly hereditary, whilst in some no cause for it could be assigned. (*Med. Times.*)

**Iodine Painting in Small-Pox.**—In 1881 there was admitted to the Konotop Hospital a woman suffering from lumbar pain and other prodromal symptoms of small-pox. To satisfy the wish of the patient, Dr. Vetroff painted the whole lumbar region with tincture of iodine. On the next day, the painted region was found covered all over with variolous rash, while the remaining surface of the body presented only two vesicles. The course of the disease was remarkably mild. Having learnt this curious fact, Dr. Bojinski-Bojko (*Vratch*, No. 1, 1883), when an epidemic of small-pox broke out in his district, began to paint with iodine the anterior surfaces of the thighs in every patient who came under his notice in the prodromal stage of the disease. In all four cases treated in this way, the rash was strictly limited to the regions painted, and the course of the affection was extremely favourable. An attempt to substitute a sinapism for the iodine gave negative results. (*Lond. Med. Record,* April 1883.)

**Phosphorus in the Treatment of Osteomalacia.**—Dr. W. Busch reports two cases of osteomalacia treated by phosphorus. The first patient was a fairly healthy-looking woman, thirty years of age, in whom the disease appeared a few weeks after childbirth. The objective signs were confined to the bones of the pelvis. This presented the appearance of having been pressed together from the sides. The symphysis projected forward like a beak, while the horizontal rami of the pubes were sharply bent. Walking was impossible, the patient being able only with the greatest difficulty to move from the bed to a chair. Absolute rest in the horizontal position was ordered to be maintained for three months, and Wegner's phosphorus pills were prescribed. After five months' treatment the patient was able to go up and down stairs without difficulty.

At this time she changed her residence and passed from under observation. The second case was that of a woman, fifty years of age, who complained of intense pain in the right arm near the insertion of the deltoid muscle. A diagnosis of ostitis was made and the ordinary measures were prescribed. No improvement was noticed, and after several weeks the patient abandoned the treatment. In about nine months she again came under observation. She was then reduced almost to a skeleton, was absolutely unable to walk, and was greatly deformed. The dorsal spine was kyphotic, while the cervical spine was so strongly lordotic that the head seemed to rest between the shoulders. The thorax was distorted, the femora were bowed, and the pelvis presented the characteristic deformity of osteomalacia. The patient was confined to the bed for seven months, and took Wegner's pills for a year and a half. At the end of this time the bones were firm, and she could go about without complaint. The deformity had not decreased. The following is the formula for Wegner's pills:—

| | | |
|---|---|---|
| ℞. Phosphori | 0·025 | gramme. |
| Syr. simpl. | 7·5 | ,, |
| M. bene et adde | | |
| Pulv. glycyrrh. rad. | 10·0 | ,, |
| Pulv. gummi arab. | 5·0 | ,, |
| Gummi tragacanth. | 2·5 | ,, |
| Ft. pil. 250. | | |

Each pill contains about $\frac{1}{650}$ grain of phosphorus. The dose is one pill twice a day, to be gradually increased. Busch does not consider the drug to be of any value in rickets or caries. (*Centralblatt für klin. Med.* Feb. 10, 1883.)

**Nature of Phthisis in Diabetes.**—Immermann and Rutimeyer have put on record (*Centralblatt für klin. Med.* Feb. 24, 1883) a case which is of interest in connection with bacterial pathology. A patient, aged twenty-nine, was brought to the hospital in a state of profound coma and dyspnœa. The urine contained three per cent. of sugar and a trace of albumen. The man succumbed in nine hours. At the post-mortem examination a vomica in the apex of the right lung with caseation was detected. The contents of the cavity yielded bacilli, which behaved to staining-fluids just as those from tuberculous cases do. Death was attributed to diabetic coma. In a footnote, Leyden (one of the editors of the *Centralblatt*) states that he has discovered the tubercle-bacilli in the sputa in three cases of diabetes complicated with phthisis. The authors speculate on the identity of the pathological process in the lungs in cases of ordinary phthisis and of diabetes. The frequency of consumption in diabetes is thought to be explained by the hypothesis that the diabetic constitution affords a specially favourable soil for the growth of the bacillus. (*Medical Times and Gazette*, March 10, 1883.)

**Dangers of Ergot in Locomotor Ataxy.**—Prof. Grasset (*Le Prog. Méd.*, 1883, No. 11) records a case of locomotor ataxy in a man aged thirty-eight, who was getting on pretty well until he was seen by Charcot, who prescribed ergot in doses gradually rising to one gramme (15 grains) daily. He returned with his prescription to his home at Marseilles, when, without having the attention of any local medical man, he proceeded to carry out the treatment. On the second day on which the full dose was taken, he became paralysed in all four extremities, with loss of voice. On omitting the ergot, he recovered slowly. Dr. Grasset recalls the recent observations of Tuczek in an epidemic of ergotism, that all the cases presented symptoms of a lesion of the posterior columns of the spinal cord, and in some cases the complete picture of locomotor ataxy was developed. In four cases the cords were examined after death, and were found to present a symmetrical lesion of the columns of Burdach. (*London Med. Record*, May 1883.)

**Poisoning by Citrate of Caffeine.**—At a recent meeting of the Medical Society of London, Dr. Routh read notes of a case of poisoning by citrate of caffeine. The drug had been prescribed in drachm doses, three times a day, for the relief of severe headache in a man under treatment for debility. Bishop's effervescent preparation was intended, but the pure drug was sent. Fifty minutes after taking one powder he complained of burning sensation in the throat, and of giddiness ; there was vomiting and purging, with pain in the belly. He then became almost paralysed, and was affected with tremors, but his intellect was clear. Dr. Routh found him an hour later collapsed ; pulse about 120. Ipecacuanha was given as an emetic, but as this failed to act, some animal charcoal, with nitrite of amyl and ether, was given. Vomiting subsequently took place, and ammonia, alcohol, and nitro-glycerine were given. For some hours he remained much depressed, and did not rally completely till 1.30 A.M. next day, or nine hours after taking the caffeine. Nitro-glycerine solution in one-minim doses was given every two hours, with digitalis, and in about three days he recovered.

**Salutary Erysipelas.**—Dr. T. Stein, in the *Vratch*, 1882, No. 16, describes a striking instance of so-called *erysipèle salutaire* (Champouillon). A sickly peasant woman, aged forty-eight, complained of a pain and tumour in her right breast, which had appeared about a year previously. The mammary gland was found irregularly enlarged, fixed to the chest-wall, hard, knobbed, at some points fluctuating; the skin was adherent, showing dilated veins. The age of the patient, the moderate rate of the growth of the neoplasm, the hardness and immobility of the tumour, and the cachexia, pointed to a malignant disease (cancer or sarcoma). The author persuaded his patient to undergo operative treatment; and meanwhile, keeping in view her anæmic state, he made an injection (half of a Pravaz's syringe) of pyrophosphate of iron with citrate of soda in the dorsal region. About twelve hours later, severe erysipelas of the neck and chest (and afterwards of the head) appeared, starting from the spot of the injection. The attack kept the patient in bed twelve days. On examination on the thirteenth day, the author, to his utter astonishment, found no tumour; nothing but two indurated knots, each of the size of a small walnut, remained. At the same time a great improvement in her general health followed. Dr. Stein was able to find out in literature only very few similar cases. (*Lond. Med. Record*, May 1883.)

**The Treatment of Stricture of the Œsophagus.**—Operations on the internal organs of the body have become much more common than they were formerly, and in recent years the stomach has been very frequently operated on with the view of counteracting the effects of œsophageal obstruction. Dr. Morell Mackenzie analyses the cases of this character which have been already published, and gives an account of two new cases. He finds that gastrostomy has been performed eighty-one times, and that death occurred from shock in twenty-seven, or in 24·6 per cent. The advantages of *gastrostomy* are:—(1) That it can be carried out with comparative ease. (2) That there is very little risk in the steps of the operation itself, especially if done in two acts separated by a proper interval of time. (3) That there is almost entire certainty of being able to effect the object aimed at, which is the establishment of an alimentary fistula altogether beyond the seat of stricture; and (4) that the fistula is hidden from sight. The only disadvantage is that gastrostomy still yields a high percentage of deaths. Twenty-six cases of œsophagotomy are analysed; of these, sixteen died within a fortnight, and seven died from shock. The advantages claimed for *œsophagotomy* are:—(1) That it is attended with comparatively little shock. (2) That it facilitates subsequent dilatation of the stricture. The disadvantages are that the operation is a very difficult one, and attended with considerable danger from its proximity to so many important structures, and there is great uncertainty in any given case whether the opening in the œsophagus can be made below the stricture; and finally a discharging fistula in the neck is a conspicuous disfigurement. Seventeen cases of *internal œsophagctomy* are analysed, and the following advantages claimed for this operation :—(1) That it is attended with an inconsiderable amount of shock. (2) That if the stricture can be thoroughly divided, gradual dilatation can be carried out, and a cure thereby effected. (3) That the procedure involves no external wound. The disadvantages of internal œsophagotomy are :—(1) That it can only be safely performed in cases where it is still possible to pass a bougie. (2) It is often difficult to pass all the strictures. (3) In many cases the walls of the œsophagus are so thickened that limited longitudinal incision does not relieve the obstruction. (4) The actual danger in the operation is far from inconsiderable. (*American Journal of the Medical Sciences*, April 1883.)

**Removal of Carious Portions of the Vertebral Bodies.**—Dr. Boeckel relates the history of a case in which he removed the carious portion of the bodies of two dorsal vertebræ by means of the sharp spoon, with gratifying results. From his experience in this case and in operations upon the cadaver, the writer concludes that it is not so difficult as is usually supposed to reach the anterior portion of the spinal column. The resection of an inch to an inch and a half of one rib affords room enough for the finger to reach the bodies of the diseased vertebræ. The danger of wounding any of the great vessels lying in front of the spinal column is not so great as it seems, as the pus has already formed a sinus which serves as a guide to the diseased bone. The bodies of the lumbar vertebræ may be reached by an incision made at the outer border of the sacro-lumbalis muscle, as for nephrotomy. The same operation is indicated in gun-shot wounds of the vertebral bodies. The difficulty in such cases lies less in the operation itself than in the uncertainty of the diagnosis respecting the location and extent of the injury to the bone. (*Schmidt's Jahrbücher*, March 14, 1883.)

**Treatment of Floating Kidney by Fixation.**—Dr. David Newman, of Glasgow, has performed for the first time in Great Britain the operation of nephrography. The operation was performed in the following manner :—The kidney was exposed by a vertical incision in the right loin, immediately external to the outer edge of the quadratus lumborum, and extending from the lowermost rib to the crest of the ilium ; the capsule of the kidney was opened and stitched to the edges of the wound, and two catgut sutures were passed through the cortex of the kidney, the muscles, fascia, and skin, and secured externally by buttons. The patient had suffered from severe symptoms, and was treated for several years without success ; but, since the operation, the symptoms have entirely disappeared, and she has now almost recovered from the effect of the operation. (*British Medical Journal*, April 28, 1883.)

**Tænia as a Cause of Aphasia.**—Dr. Armangué relates (*Jour. de Méd. et de Chir. Prat.*) the case of a woman of sixty who was seized with vertigo, and a few days later lost the memory of words for some days. After the expulsion of a tapeworm there was no return of her nervous troubles. He quotes a case of aphasia in a child cured by the expulsion of numerous trichocephali, published by Daniel Gibson; and a case of aphasia coinciding with tænia published by Siedel. The editor adds a case, observed by Langer in Germany, of reflex hemiplegia and hemianæsthesia with convulsive seizures, in a little girl of twelve, cured by expelling a tænia. (*Lond. Med. Record*, May 1883.)

**Percussion of the Colon in Diarrhœa.**—Diarrhœa depending upon fæcal accumulations in the lower bowel (*diarrhœa paradoxa*) is a well-known condition, the treatment of which by laxatives is of long-recognised utility. The diagnosis, however, between this form of diarrhœa and that other whose locality is, more strictly speaking, in the small intestine, has often presented considerable difficulty. In an article upon this subject, in the *Deutsche medicinische Wochenschrift* of February 14, 1883, Dr. Goedicke, of Plön, advocates the systematic practice of abdominal percussion in cases of diarrhœa. He was led to adopt the practice in this wise:—Several years before, when a young army surgeon, his suspicion was aroused by the number of soldiers coming to him with the complaint of diarrhœa. In order to detect the malingerers, he made use of percussion of the colon, reasoning that in genuine diarrhœa the descending colon should be empty, and therefore give a tympanitic percussion note. He was surprised, therefore, to find that the contrary was usually the case. In most of the men in whom diarrhœa actually existed, as was ascertained from the reports of the infirmary orderlies, the percussion note of the descending colon was dull. The investigations thereupon undertaken led him to the following conclusions:—(1) In a healthy individual with normal motions, if we percuss the colon, we shall find that the left iliac fossa usually gives a flatter note than the right. (2) In patients suffering from diarrhœa the greater dulness may be on either side, but is usually, in otherwise healthy persons, on the left. (3) The same condition obtains in children. (4) Whenever there is tenderness on pressure, it is found on the same side as the greater dulness. (5) The term "dulness" is to be understood as relative and not necessarily absolute, for the percussion note on both sides may be actually tympanitic if the colon be distended with gas. The author asserts that by far the more common form of diarrhœa is that excited by fæcal accumulation in the large intestine. It is this variety which is characterised by increased relative dulness in the left iliac fossa, and in which opiates and astringent remedies are contra-indicated. In the other form of diarrhœa the trouble is in the upper bowel, and here the percussion note upon the right side is more dull, or less tympanitic, than that on the left. It is in these cases that the ordinary diarrhœa medicines find their application. Dr. Goedicke concludes by urging the practice of abdominal percussion in every case of diarrhœa, where possible (it is always possible in children, and it is in children that the knowledge of the true nature of the trouble is of the greatest importance). And he states his conviction that the more general this practice becomes, the less frequently will opium be employed in the treatment of diarrhœa. (*New York Med. Record*, May 19, 1883.)

**Treatment of Ulcers by Traction on their Margins.**—Dr. Penny, of Galveston, writes:—J. H. came to me from the country, suffering from a severe scalp wound over four inches in length, situated on a line with the junction of the left parietal and frontal bones. The wound was gaping widely, secreting pus profusely, and extremely irritable. I shaved the scalp and applied strips of adhesive plaster, but finding that I could not get sufficient traction in this way, I applied strips of plaster nearly as wide as the wound was long, with a series of holes punched on the side next the wound; through these holes I passed a cord, lacing the two strips together like a shoe. The patient came back after a few hours to have the lacing tightened, saying that it made the wound more comfortable. Seeing that the retraction of the edges of the wound was due to the contraction of the cut fibres of occipito-frontalis, as well as of the muscular and elastic fibres of the derma, I substituted a rubber cord for the non-elastic one in use. The next day the patient returned, highly pleased at having spent such a comfortable night. I then removed my strips with the lacing, substituting strips of adhesive plaster with hooks on the end which was placed next the wound, using small rubber bands for connecting the opposing strips. This completed the dressing, and is the form which I now use. The continuous traction and moderate compression exerted by this dressing relieves the ulcer of its hyperæmic condition; its thickened edges soften down; the excavation fills rapidly, and the remaining cicatrix is small and remarkably flexible. I have used this strapping in a large number of cases, including varicose ulcers of the leg, syphilitic ulcers upon the scalp, leg, body, etc., some of large size, with the most satisfactory results in all the cases treated. Recently I used this dressing in two ulcers: one on the outer aspect of the arm just above the elbow; the other over the tibia below the patella. We all know the difficulty of healing an ulcer near a joint owing to the great mobility of the parts. The strapping gave physiological rest to the structures, and cicatrisation proceeded rapidly. A short time ago I applied the strapping in a case where the breast was amputated for cancer. In this case there was a very large gap to be filled. Under the steady traction of the rubber bands the flaps approached each other, and in twenty-four hours the wound was closed. One of the chief advantages of this strapping is the great saving of time in dressing wounds. The rubber connecting bands can be removed in a moment's time, the wound or ulcer dressed, and in less time than it would require to remove the ordinary adhesive strips. (*Philad. Med. News,* May 12, 1883.)

**Pulmonary Cavity treated by Intrathoracic Injection.**—Professor Maragliano relates the following case in the *Gazz. Med. Ital. Prov. Venete,* March 10, 1883. A man, aged 26, with good family and personal history, had a bad fall, hurting his right side, and causing slight hæmoptysis; this was followed by constant pain in the side, fever, muco-purulent expectoration and great emaciation. On admission the right chest was dull posteriorly below the eighth rib, with signs of a cavity. The cough was troublesome; the expectoration muco-purulent, very abundant, amounting to 500 cubic centimetres in the twenty-four hours. Elastic fibres, epithelium, and leucocytes were recognised by the microscope. Tar-water internally and inhalations of turpentine lessened the expectoration. The temperature was high, reaching 39°·8 C (103°·6 F). Phosphate of lime and iron and cod-liver oil were given, but the patient continued to lose weight. Six cubic centimetres of a solution of nitrate of silver (1 in 25) were injected in the situation of the cavity, causing great pain for two hours, but no increase of temperature. The expectoration diminished marvellously, on the next day being only 30 cubic centimetres; it increased slightly afterwards. The patient would not submit to a second injection, and was discharged. He continued to improve rapidly, and a year afterwards, on examination, the dulness remained, but there were no râles, the respiratory murmur was abolished; cicatrisation of the cavity had evidently taken place. The patient was in good health and able to work. (*Lond. Med. Record,* May 1883.)

**Ergot as a Preventive of the Poisonous Effects of Salicylic Acid.**—Dr. Schilling recommends the administration of ergot in conjunction with salicylic acid or quinine, to obviate the unpleasant effects of those drugs. He had observed in a number of cases in which large doses of salicylic acid were taken, a marked congestion of the external auditory canal and membrana tympani. He was thus led to give ergot to cause a contraction of the vessels, and obtained in every case a cessation or notable diminution of tinnitus and deafness. The dose of ergot (aqueous extract) should be about one-tenth that of the salicylic acid. The antipyretic effect of the latter is not weakened by the ergot. Like favourable results were obtained by combining ergot with quinine. (*Allgem. med. Central-Zeitung*, March 21, 1883.)

**Meteorism in Hysteria.**—Dr. Ebstein recently made experiments on the competence of the pyloric sphincter in two hysterical patients, who were apt to suffer from rapidly developed and extreme meteorism. His method was to administer effervescing mixtures, and so to produce considerable quantities of gas in the gastric cavity. As Kussmaul has maintained that during fasting the pylorus is normally patent, Ebstein administered his mixture within a short time after breakfast, and in small doses; by this means he avoided the danger of, as it were, forcing the passage of the pylorus by the sudden development of a large volume of gas. The result showed that in both patients sudden and considerable tympanites of stomach and intestine was produced. The inference was that in these patients the pylorus was morbidly patent or incompetent, and that the meteorism was due to the passage into the intestine of gas or air ordinarily confined to the stomach, or vented by the cardiac orifice, as in the case of air which is swallowed. (*Neurologisches Centralblatt*, No. 3, 1883.)

**Glycosuria with Urine of low Specific Gravity.**—Professor Cameron reports certain cases in which he has found sugar in urine of a specific gravity of 1015, 1008, 1007, and even 1005. Some of these were merely temporary drops from an ordinary gravity of 1025 to 1035. There was no doubt as to the purity of these low specimens from any admixture with water after being passed. In the urine of 1005 there was a mere trace of urea, and the solids consisted almost entirely of sugar and chloride of sodium. The writer gives an important caution as to applying the sugar test in the following words:—"In examining urine it is always necessary to look for sugar, no matter whether the specific gravity of the fluid may be normal or otherwise. I occasionally find urine with a very high specific gravity, and with a, so to speak, diabetic appearance, to be quite free from sugar. On several occasions, in specimens of urine believed to contain sugar, I could not detect a trace of that substance. A few months ago I examined the urine of a man who had been treated for diabetes. The urine had a specific gravity of 1035, and, on being boiled with Fehling's solution, it gave a copious precipitate of cuprous oxide. There was something in the appearance of the precipitate, and in the slow way in which it made its appearance, that led me to suspect that it was not produced by sugar. This proved to be the case, for on treating the urine with yeast no carbonic acid (save a mere trace) was evolved. The presence of large quantities of urates in urine causes a brown precipitate with Fehling's solution. The urates, even when abundant, do not always separate as the characteristic 'brick-dust.' I have found very large quantities of urate of ammonium in urine which remained clear on standing, but which gave a brown precipitate on being boiled with Fehling's solution. When testing for sugar in urine it is necessary to ascertain whether or not urates are present in large quantities. If they are they can be precipitated by the addition of hydrochloric acid, and the urine filtered or decanted from the precipitate can then be satisfactorily tested for sugar with Fehling's solution." (*Dublin Journal of Medical Sciences*, April 1883.)

**Ligature of the Innominate Artery for Subclavian Aneurism.**—A case of this operation is recorded by Mr. Thomson of Dublin. The artery was secured with a piece of Mr. Barwell's ox aorta ligature. Hæmorrhage occurred on the thirtieth and thirty-ninth days, and the patient died on the forty-second. There are many points of interest in the case which can only be properly appreciated by a reference to the account itself; but the following are a few of the more important: 1. The secondary hæmorrhage did not occur from the seat of ligature, but from an ulceration in the artery, at least a quarter of an inch away from it. 2. The coats of the artery were not at all divided by the ligature, and yet though all trace of the ligature had disappeared, even after the most minute search, the artery remained contracted and quite impervious at the seat of ligature. (*Pamphlet on Subclavian Aneurism. William Thomson: Dublin,* 1883.)

# Extracts from British and Foreign Journals.

**Gelsemine.**—This alkaloid has now been prepared in considerable quantity by Mr. Gerrard, and its salts have been examined. The author's results differ from those of previous observers in showing that the pure alkaloid gelsemine is crystallised and colourless, forming crystalline salts with acids, and has a formula $C_{12}H_{14}NO_2$. It gives no colour-reactions with nitric or sulphuric acids, and the gelsemine of Sonnenschein which gave such reactions must have been impure. In cases of poisoning by gelsemine where the resin, extract, or tincture has been used, they can be detected by the reactions for the alkaloid. This substance gives a blue fluorescence to any mixture on the addition of an alkali. The alkaloid would be separated by the same methods as those used for strychnia; when isolated it gives a red colour with sulphuric acid and manganic oxide. In addition to this the physiological test would require to be applied. (*Pharmaceutical Journ.*, No. 659, 1883.)

**Physiological Action of Gelsemine.**—Dr. G. Rouch finds that two to five milligrammes of the hydrobromate of gelsemine produce in the common frog a slight excitability which quickly passes into torpidity, and this becomes complete in about half an hour. There appears to be, first loss of voluntary power, and afterwards paralysis of reflex action; both due to the action of the drug on the nerve centres. The position assumed by the frog is a peculiar one, the posterior limbs being drawn towards the body and quite relaxed, but the anterior ones are sometimes crossed under the sternum like a bow, or, at other times, divergent from the sides of the body. In the green frog the symptoms are at first nearly similar, but after two days there is great excitability, and tetanic contractions something like those of picrotoxin are produced on irritation. These symptoms gradually disappear in about three days. Dr Tweedy finds that crystallised gelsemine is less irritating and more prompt in its action than earlier preparations, but it does not produce such distinct paralysis of accommodation as atropia. The dilatation of the pupil by it is preceded by a brief stage of contraction accompanied by a zone of ciliary injection, both of which quickly pass off. (*Pharmaceutical Journ.*, No. 659, 1883.)

**The Function of the Pancreas in Fever.**—This subject has been investigated by Stolnikow. He considers that the secretion of the pancreas in fever is at first increased, then diminishes, and finally ceases entirely, probably from paralysis of secreting nervous centres. The amount of ferment in the glands at first likewise increases and afterwards diminishes, probably from its diminished production in consequence of the depression of the trophic nerves on the one hand and of pathological processes in the secreting cells on the other. The depressing influence of the fever is greater than its exciting action, in regard to the strength, persistence, and duration of the effect. This condition affords a rational basis for the use of pilocarpin in fever. In fever, all the ferments of the pancreas being weakened in action, a number of products of imperfect digestion are formed. This fact lends support to the theory of Professor Botkin who thinks that fever is due to the accumulation in the organism of the products of imperfect oxidation which either do not sufficiently stimulate, or it may be actually depress the nervous apparatus which regulates the temperature. The diminished secretion of the pancreas may perhaps be related to the fact that in diabetes sugar completely disappears from the urine when any febrile process occurs. Such a relation is all the more possible as the fever not only arrests the secretion of the pancreas, but causes the glycogen in the liver to diminish or disappear. The author's observations show that a certain analogy exists between septic poisoning and atropia,—both of them paralyse the secretion from the salivary gland and diminish the digestive action of the pancreatic ferments on albumen. Septic poison first causes increase and then arrest of the secretion of saliva. This occurs when both the chorda tympani and the sympathetic in the neck are divided. When the nerves are tested by faradaic currents, it is found that the chorda becomes paralysed sooner than the sympathetic. There is a remarkable irregularity in the variations of the three ferments of the pancreas in fever: those ferments which act upon fat and starch are much diminished, whereas that which digests albumen is but little affected. The author has already shown that a ferment resembling trypsin in its action on albuminous substances is formed during the putrefaction of albumen, and he thinks that possibly some such substance is formed in the body generally by the decomposition of the tissues in fever, and that it is simply excreted by the pancreas. From consideration of the different effect of various nutritive substances in exciting secretion, he thinks that it is possible that the formation of the three kinds of ferments in the pancreas may be regulated by three different sorts of nerves, and that these may be differently affected by the septic poison. (*Virchow's Archiv*, page 389, vol. xc.)

**The Pathology of Bronchial Asthma.**—Professor Riegel of Giessen, in approaching the consideration of the pathology of asthma, remarks that there are several distinct questions involved, which are still more or less imperfectly settled. The first of these questions manifestly is—Is there really such a function in the bronchial muscles as active contraction, sufficient to affect the calibre of the tubes and to modify the pressure of the air within the lungs? Very different have been the answers given to this question by different physiologists—for we must be careful to notice that this is but a matter of physiology, and not of clinical medicine. Professor Riegel's results are entirely in accordance with the accumulating evidence of the work of recent, as well as of some of the older and most distinguished, observers—namely, that irritation of the bronchial muscles does raise the pressure within the lungs, and that this irritation may be induced through the medium of the vagus. This point having been settled, the next question was whether stimulation of the vagus caused acute dilatation of the lungs, such as is seen in asthmatical seizures? and this question, also, Professor Riegel was able to settle in the affirmative, the pulmonary area enlarging rapidly when the vagus was galvanised in the neck (in dogs), remaining large during the continuance of the stimulus, and slowly returning to its normal dimensions when the irritation was removed. Nothing could have been more easy, or indeed more natural, than to conclude after these two series of experiments that the pathology of bronchial asthma was practically settled; that this disorder is essentially a neurosis of the vagus, the dyspnœa due to bronchial spasm and the pulmonary dilatation being the direct results of irritation of the great nerve of respiration. Professor Riegel was too cautious, however, to rush to this conclusion, and his next set of observations showed the wisdom of his hesitation; for they distinctly proved that whilst irritation of the vagus unquestionably produces the phenomena of asthma, *it does not do so by causing spasm of the bronchi.* No doubt, as has just been shown, spasm of the bronchi is a result of irritation of the vagus; but there is a much more important, because much greater or more extensive, cause at work than this.

The turning-point in the investigation was the discovery that irritation of the vagus causes the phenomena of asthma, not by acting peripherally—that is, through the branches to the bronchi—but by influencing the central extremity of the nerve, that is, the medulla, and so (reflexly) the muscles of respiration. When the *central* end of the divided vagus of the left side was faradised, and the other vagus cut, the same asthmatic phenomena were produced; the reflex, therefore, did not occur through the bronchial nerves, but by the respiratory nerves to the diaphragm and intercostals. That this was the case was completely proved by section of the phrenics before irritation of the vagus, for the phenomena of asthma were then entirely absent. An altogether unexpected result was thus reached, namely, that asthmatical phenomena may be produced *reflexly* through the vagus, and that the principal portion of the effect is a sudden inspiratory depression of the diaphragm, followed by its continued tonic contraction. It would thus appear that the theory of asthma, which represents the disorder as essentially one of bronchial spasm, must be given up. There can be no doubt that irritation of the vagus does cause bronchial spasm and moderate dilatation of the lungs, but this effect has always been regarded as much too insignificant to account for the symptoms of the disorder as clinically observed; and now that it appears to have been satisfactorily proved that besides this peripheral effect there is a reflex effect of incomparably greater importance, there is no reason why the theory of bronchial spasm should be any longer maintained.

Two very obvious objections to the view first stated are anticipated by Professor Riegel. Can it be possible, in the first place, that the diaphragm may remain so long in a state of contraction as to cause the protracted dyspnœa familiar in many cases of asthma? There is no evidence to the contrary; and in the course of these experiments on dogs the diaphragm was actually seen to remain in a condition of contraction for ten minutes without producing asphyxia. Besides, the same objection might apply to the muscles of the bronchi. Again, it is a clinical fact that whilst the inferior lung-border is low in an attack of asthma, it moves in respiration. Is this fact compatible with spasm of the diaphragm? As a matter of fact it is: whether the phrenic be directly or indirectly stimulated, and the diaphragm thrown into inspiratory spasm, the lung-border moves slightly in respiration.

Lastly, Professor Riegel cautions us against coming to the hasty conclusion that we have now settled the pathology of bronchial asthma. Spasm of the diaphragm may explain some of the phenomena of the seizure, but it certainly will not explain all. For himself, he still holds that there may be vaso-motor disturbance and hyperæmia of the bronchi, along with spasm. Still, spasm there is, and the present investigation shows that it is chiefly a spasm of the diaphragm. (*Zeitschrift für klin. Med.*, p. 413, vol. v.; *Med. Times.*)

**Antidotum Arsenici.**—A very important new preparation (in the new American Pharmacopœia), whose name will probably convey to most of our readers no idea of its use or value, is *Ferri Oxidum Hydratum cum Magnesia.* Much better would it have been for the committee to have adopted the name of the German Pharmacopœia, instead of this ponderous appellation. *Antidotum Arsenici* conveys a very definite idea, and is brief. The new antidote, without doubt, is superior to the old hydrated sesquioxide of iron; indeed it is merely the old friend in a new and improved garb. Magnesia added to a solution of a sesquisalt of iron precipitates the sesquioxide. The excess of magnesia is not irritant, like ammonia or potash, and has the further advantage of adding to the efficiency of the antidote. In a case of arsenical poisoning, agitate magnesia in excess with the tincture of chloride of iron, or with any of the sesqui-iron solutions, pour off the liquid, and administer the bulky precipitate freely. (*Philad. Med. Times*, Jan. 27, 1883.)

**Condensed Whey.**—By evaporating whey *in vacuo,* Prof. Alexander Mueller obtains whey as a thick dough which keeps for months without spoiling or moulding. It is better than anything else for making milk-sugar. It may be used in making different kinds of pastry or bread: for this purpose its milk-sugar and milk-salts especially fit it. It makes the bread both nutritious and agreeable. (*Pharmaceutical Journ.*, No. 660, 1883.)

**Strychnia in Atrophy of the Optic Nerve.**—Dr. Rampoldi of Pavia draws attention, in a carefully written essay, to the employment of strychnia in cases of atrophy of the optic nerve. His observations have led him to the conclusion that the improvement observed after the first few days of treatment is only transient, and that in order that it should become permanent, the administration of the remedy should be continued till toxic symptoms begin to be perceptible. He has employed powders composed of 0·03 gramme of St. Ignatius' bean with various preparations of iron, and has simultaneously injected beneath the skin 0·001 gramme of strychnia nitrate dissolved in two grammes of water. In a note on this passage Dr. Parisotti remarks that even the good results obtained from the administration of the drug in toxic doses passes away when, in the course of the ordinary metabolic changes of the tissues, the whole of the poison has been eliminated. (*Recueil d'Ophthalmologie*, April 1883.)

**The Tubercle-Bacillus.**—A painstaking and valuable contribution to the pathology of tuberculosis has been read before the Academy of Medicine by MM. Cornil and Babes. In general terms the conclusions aimed at by these histologists may be said to harmonise completely with all the teachings of Koch. Descriptions, illustrated by drawings representing the disposition and topography of the bacilli stained after Ehrlich's method in the tubercles of the meninges, serous membranes, mucous membranes, lungs, lymphatic glands, spleen, liver, and urinary organs, were given. Experimental inoculation with the sputa from cases of phthisis which contained bacilli into the peritoneal cavities of guinea-pigs gave rise, after five or six weeks, to an abundant crop of miliary tubercles in the spleen, liver, peritoneum, intestines, mesentery, genital organs, lungs, and lymphatic glands; these miliary bodies also abounded in bacteria. MM. Cornil and Babes have also searched for the bacilli in a series of lesions which, rightly or wrongly, may be regarded as intermediate between tuberculosis and scrofulosis. The characteristic micro-organisms were demonstrated in two out of three examples of scrofulous glands of the neck, taken from different individuals presenting no other obvious disease. The organisms were seen in small numbers, and only in the giant-cells. The gland that was found wanting was the seat of much fibroid induration. No bacilli were discovered in a "tuberculous" abscess of the breast, nor in two cases of "tuberculous" abscess of the skin. Of three cases of *tumor albus* the bacilli were detected in but one instance, then in great scarcity, and exclusively in the centre of giant-cells. Negative results were also the outcome of examinations of fragments from cases of caseous pneumonia, interstitial pneumonia, fibroid pleura, and caseous pneumonia with vomicæ in a syphilitic patient. Altogether forty histological investigations were carried out, and M. Cornil is of opinion that from a pathological point of view a division of the cases into three classes may be made. In the first class would be placed all those instances in which the number of bacilli was considerable enough to explain the appearance of the tuberculous lesions, just as it is supposed the nodules of leprosy may be accounted for by the growth of bacteria —in fact, examples of a genuine parasitic affection. The spread of the micro-organisms by way of the blood and lymph channels is believed to be proved by the presence of the bacilli in the interior of and about the vessels. The bacilli in the second series are not numerous, but they always exist in the midst of the tuberculous lesion; this fact of central existence is regarded as sufficient to justify a belief in the notion that here, too, the affection is essentially a mycosis. The last division contains those examples of the chronic form of the disease in which the bacteria are found only in the tissues which bound cavities and in caseous material. In order to bring these cases into harmony with the prevailing views, it may be supposed that when the number of bacilli is far from being able to explain the lesions observed, there has been an elimination or destruction of bacilli, but not before they have had time to set certain inflammatory processes in action. The arrangement of the organisms in ancient tuberculous deposits may be explained by taking into account the action of the leucocytes in transporting the bacilli, and by bearing in mind that a constant elimination probably goes on when much expectoration occurs from the lungs, or when the *débris* of ulceration are carried off by means of the stools and the urine. (*Lancet*, May 26, 1883.)

**Demonstration of Tubercle-Bacilli.**—Dr. Heneage Gibbes writes: The following method, which I have used for some time with great success, will I think prove useful to those requiring the demonstration of the tubercle-bacillus for diagnostic purposes in a rapid manner. The great advantage consists in doing away with the use of nitric acid. The stain is made as follows: Take of rosanilin hydrochloride two grammes, methyl blue one gramme; rub them up in a glass mortar. Then dissolve anilin oil 3 ccm. in rectified spirit 15 ccm.; add the spirit slowly to the stains until all is dissolved, then slowly add distilled water 15 ccm.; keep in a stoppered bottle. To use the stain: The sputum having been dried on the cover-glass in the usual manner, a few drops of the stain are poured into a test tube and warmed; as soon as steam rises, pour into a watch-glass, and place the cover-glass on the stain. Allow it to remain for four or five minutes, then wash in methylated spirit until no more colour comes away; drain thoroughly and dry, either in the air or over a spirit-lamp. Mount in Canada balsam. The whole process, after the sputum is dried, need not take more than six or seven minutes. This process is also valuable for sections of tissue containing bacilli, as they can be doubly stained without the least trouble. I have not tried to do this against time, but have merely placed the sections in the stain and allowed them to remain for some hours, and then transferred them to methylated spirit, where they have been left as long as the colour came out. In this way beautiful specimens have been made, without the shrinking which always occurs in the nitric acid process. The stains may be procured from Messrs. R. and J. Beck, 68 Cornhill, E.C., either in crystals or in solution, ready for use. (*Lancet*, May 5, 1883.)

**Addison's Disease and the Suprarenal Capsules.**—From a study of the literature bearing upon this subject, Dr. Carl Burger arrives at the following conclusions: The suprarenal capsules are, from their structure, to be classed among the blood-vascular glands, and have no important vital function to perform. They stand in no causal relation to the bronzing of the skin.

This dark-colouring of the skin occurs not only in Addison's disease, but may accompany a variety of cachexiæ. Disease of the suprarenal capsules is not infrequent, and often runs its course without any of the recognised symptoms of Addison's disease. The greatest variety of lesions of the capsules may be seen in different cases of Addison's disease. Addison's disease depends upon an affection of the semilunar ganglia and of the solar plexus. This affection is usually caused by some disease of the suprarenal capsules, most frequently a tuberculous inflammation. Disease of the semilunar ganglia and solar plexus may arise from lesions of other organs than the suprarenal capsules, or may even be idiopathic. The symptoms of Addison's disease may thus be present without any lesion of the suprarenal capsules. (*Allgem. med. Central-Zeitung*, March 14, 1883.)

**Medicated Gelatine in the Treatment of Skin Diseases.**—Dr. Pick speaks highly of medicated gelatine in the local treatment of various skin diseases. It is a clean and convenient dressing, obviating the necessity of bandages or plaster to retain the application. After a bath the patient applies the gelatine, melted in a water bath, with a brush, and after it is dry paints over it a thin coat of glycerine. The latter prevents cracking and chipping off of the dried gelatine, and also keeps it flexible, so that the joint movements are not interfered with. The following is the mode of preparing the medicated gelatine: Dissolve fifty parts of gelatine in one hundred parts of distilled water in a water bath. Then add the medicament in the desired proportion, stirring constantly. Then set the mixture aside, and when cool, wrap in oiled paper. The patient is instructed to melt a piece of this gelatine cake in a saucer set in hot water, and when fluid, to apply with a camel's-hair pencil to the diseased surface. When it is desired to make a fresh application, the patient takes a warm bath and the old dressing is washed away. (*Allgem. Wiener med. Zeitung*, Feb. 13, 1883.)

**Iodine as a Gastric Sedative.**—The employment of iodine for the relief of the vomiting of pregnancy has been somewhat in vogue for a number of years. And while the success attending its use has been pointed out with more or less enthusiasm, its exact value has never been established. Dr. T. T. Gaunt has for a number of years been employing the compound tincture of iodine in drop doses in nearly all forms of emesis, and reports thirteen cases of the most varied character, in all of which vomiting was promptly arrested by the use of this drug. (*American Journal of the Medical Sciences*, April 1883.)

**Resorcin in Hyperpyrexia, in Intermittent Fever, and in Anthrax and Erysipelas.**—Resorcin, which has been called "poor man's quinine," is attaining a useful position in therapeutics. In Dr. Braun's clinic (*Wien. med. Presse.* i. 1883) it has been used in over 300 cases of child-bed fever, in all cases where the pyrexia attained a certain grade, and almost invariably it produced a marked reduction of temperature, generally to the normal, rarely below, which usually was accompanied by more or less sweating. In some cases this was profuse. The temperature after its reduction seldom remained low longer than a few hours, so that the dose had to be repeated in the evening when a high morning temperature had required its use earlier. The usual dose was three grammes (forty-five grains), which sometimes had to be repeated. In cases where such large doses cause nervous symptoms, smaller ones are advised to be given and frequently repeated.

In intermittent fever resorcin has a position not far below quinine, although the dose is larger. Ugo Bassi (*Gaz. Med. Ital. Prov. Venet.* 1883) reports its use in twenty cases, which were all cured except three. In one case the attacks were relieved by the remedy, but it did not prevent recurrences; this happens also with quinine. In all the remaining cases the cure was permanent, the patients being instructed to avoid fresh malarial poisoning. It required only two or three doses of two to three grammes each (thirty to forty-five grains) simply dissolved in water to effect the cure. Larger doses are not necessary. The great advantage of resorcin over quinine is its cheapness.

Dr. Skibnevsky (*Medizinskoje Obosrenije*, December 1882) reports two cases of erysipelas in which subcutaneous injections of a five per cent. solution caused a rapid disappearance of the symptoms. From ten to twenty injections were made at one time into the affected area, and in each case they had to be repeated only once. It is worthy of notice that, in both cases, within about two hours after the injection not only did the fever disappear, but the temperature fell even below the normal.

Although resorcin in any form is not absorbed by the healthy unbroken skin, the contrary is the case when there is any morbid action going on in the skin, as in lepra, rupia, variola, scarlatina, or erysipelas, in which it both stains the skin and discolours the urine. In cases of parasitic disease of the skin its use has been attended by remarkable success. Dr. Justus Andeer has reported a case (*Aerztlich. med. Blatt*, 1883) of carbuncle in which bacilli were detected, and a guinea-pig being inoculated with the pus died of septicæmia. Other remedies had been used locally without much result, when a fifty per cent. resorcin-vaseline salve was applied rather freely upon the pustular erysipelatous surface of the forearm, covered by a gauze bandage. A good diet was given. After this the pain and tension diminished, the surface rapidly assumed a more healthy appearance, and the eruption soon healed. The reporter declares that resorcin, whether in strong or weak solution, is entirely free from irritation, and never produces any eruption, and is, therefore, to be preferred to all aromatic disinfectants. It is best used in the form of salve. It is completely innocuous to the skin, and causes neither hæmoglobinuria like naphthol, nor toxic symptoms similar to those caused by carbolic acid, pyrogallic acid, &c. He does not approve of subcutaneous injections of the remedy. [*Practitioner*, xxix. 139.] (*Deutsche med. Zeitung*, No. 11, 1883.)

**Castor Oil and Glycerine as a Purgative.**—Dr. Soper says:—After many months' experience, I now feel justified in bringing to your notice the great advantages of a combination of the above two drugs in equal proportions to act as a purgative. Glycerine has great therapeutic value, especially in its solvent properties, and this combination renders it especially valuable. In regard to castor oil, I think a great mistake has been made in the largeness of dose administered, and in this mixture only half a teaspoonful is required combined with an equal bulk of glycerine. In all cases of chronic constipation, hæmorrhoids, and anæmia, it has proved most useful. A scybalous motion is apparently emulsified, and is passed with the greatest ease. I have also given half-teaspoonful doses in the early stages of bronchitis, which seem to promote exudation from the tubes, and is certainly expectorant. My great difficulty hitherto has been the obstinacy with which the mixture becomes a mixture; as it can only be made by placing the bottle in hot water and violently agitating. (*Lancet*, Feb. 10, 1883.)

**The Use of Santonin.**—Dr. Lewin finds fault with all the usual methods of administering santonin. According to him it should be given in its least soluble form, *i.e.* in that form in which it will be the least readily absorbed, as the effect desired is not a general, but a local one. According to his experiments performed on animals, an oily solution of santonin undergoes not the slightest absorption in the stomach, so that under no circumstances is any trace found in the urine. Küchenmeister moreover asserts that an oily solution is more poisonous to worms than any other. Almost any kind of oil may be employed—cocoa-nut oil, olive-oil, cod-liver oil, or castor-oil. He recommends that three grains of santonin be mixed with two ounces of oil and given in four doses. He thinks that a useful addition to the above would be that of an oil contained in santonica, the oleum cinæ æthereum, for the reason that all ethereal oils have been shown to act as poisons on the lower forms of animal life. (*Berl. klin. Woch.* No. 12, 1883.)

**The Relation between Serum-Albumen and Globulin in Albuminuria.**—This subject has been further investigated by Professor F. A. Hoffman. He finds that ascitic fluid contains less albumen than the serum of blood. This is not extraordinary: albumen diffuses slowly through animal membranes, and when we make experiments on dialysis of albuminous fluids the dialysate always contains less albumen than the original fluid. But curiously enough the proportion of globulin and of serum-albumen in the ascitic fluid is tolerably near that of the blood, whereas in ordinary dialysis globulin passes through more slowly and in less quantity than albumen. This shows that transudation in living tissues goes on in a different way from dialysis outside the body. In albuminuria the relation of globulin to albumen varies much, and varies greatly in the same individual at different times of the day. Improvement in the condition of the patient is always marked by a diminution in the proportion of globulin. This is generally associated, but not always, with a diminution in the total amount of albumen. The relative proportions of albumen and globulin do not depend upon histological changes in the kidney. All kinds of proportion may occur in each form of kidney disease, but the proportion is of great practical value, inasmuch as it depends upon the intensity of the morbid processes going on in the kidney. In two persons suffering from the same form of kidney disease, the condition of the one with the smaller proportion of globulin is better. The proportion of globulin to albumen in albuminuria is often many times less than in serum. This condition differs greatly from what occurs in ascitic fluid, and agrees with what occurs in artificial dialysis. We should expect that this condition would be best observed in cases of slight lesion of the glomeruli, but on the contrary it is found that in cases of congestion where we might be apt to assume that the albumen transudes through the glomeruli, the relation of albumen to globulin is the same as in ascitic fluid. In acute and chronic nephritis the rule may be laid down that when the lesions are slight the relation of globulin to albumen agrees with that of ordinary diffusion through parchment paper, viz. that the albumen much exceeds the globulin. The greater the lesion, the more does the proportion resemble that in ascitic fluid, viz. the more nearly do the quantities of albumen and globulin become equal. (*Virchow's Archiv*, p. 271, vol. 89.)

**The influence of Gum Arabic on certain Chemical Reactions.**—This subject has been investigated by Lefort and Thibault, who find that many metallic salts, when mixed with sulphides or sulphuretted hydrogen give no precipitate if gum be present in the solution. Thus when gum arabic is added to solutions of arsenious, antimonious, ferrous, manganous, mercuric, copper, lead, silver, and zinc preparations, they remain in solution and only alter their colour, instead of giving a precipitate, when sodium sulphide is added to them. Gum likewise prevents the precipitation of neutral phosphate of ammonium by calcium chloride, uranium nitrate by potassium ferrocyanide, and very dilute solution of ferric chloride by ammonia. In like manner no precipitates were produced when gum was present in solutions of the following alkaloids—quinine, cinchonine, morphia, strychnia, brucia and veratria, by the usual alkaloidal re-agents, phosphomolybdate of ammonia, double iodide of mercury and potassium, and tannin. This is of great importance, as alkaloids have to be separated by their re-agents in medico-legal cases from liquids containing various organic matters.

Iodides of lead and mercury, sulphate of barium, and carbonate of lead, are precipitated in solutions containing gum, more slowly than, but almost as completely as in distilled water.

The non-precipitation of other substances in the presence of gum does not appear to be due to the gum dissolving the precipitate, but only to preventing its formation, for once formed, gum does not re-dissolve the precipitate.

These researches are of interest not only in pharmacy, but in physiology, as most organic liquids contain gum or analogous substances, and it is therefore possible to conceive that substances capable of acting chemically upon each other may exist in solution in the same animal or vegetable cell without combination occurring. (*Pharmaceutical Journal*, No. 642.)

**Action of Adonis Vernalis.**—The action of this plant was first investigated by Dr. Bubnow, who concluded that it acted like digitalis both physiologically and clinically. He was unable to isolate the active principle, but Dr. Cervello has been more successful. It is a glucoside to which he has given the name of adonidin. It contains no nitrogen, has no taste or smell, is amorphous and very bitter: soluble in spirit but sparingly soluble in ether and water. Its general action on animals is almost exactly the same as that of digitalin. It affects the frog's heart in the same way as digitalin, and seems more powerful than either digitoxin, or scillaïn; the dose necessary to stop the heart either of the red or green frog in summer being 0·15 milligramme. It lessens the power of voluntary muscles to do work, and acts on the blood pressure almost exactly in the same way as digitalis. He thinks that this plant has the advantage over digitalis, that it produces no accumulative action; but this is a point according to which he adduces no evidence: and it would be very unsafe indeed to draw any definite conclusion regarding it, without large clinical experience. (*Archiv f. experimentelle Pathologie und Pharmakologie*, vol. xv.)

**Pungent Liniment of Iodine.**—Some specimens of iodine liniment when applied to the skin emit an exceedingly pungent irritating vapour. Mr. McEwan has examined specimens of this sort and finds that in all probability the pungency is due to the liniment being prepared with methylated spirit. He considers that it is not the methyl alcohol which gives rise to this pungency, but the impurities which are present in ordinary methylated spirit. (*Pharmaceutical Journal*, Jan. 27, 1883.)

**Removal of the Testicle in Operations for Scrotal Hernia.**—After alluding to the difficulties which oftentimes beset an operation of this kind, owing to the adhesions which are set up in an old standing case, or in one which has undergone much inflammatory change, Dr. Kraske shows that we may be reduced to the alternative of leaving the external abdominal ring open after a prolonged and tedious dissection, or cutting into the tunica vaginalis, so as to free the testicle from danger of destruction during the process of radical cure. Even if all possible care be taken to prevent it, the testicle sometimes sloughs subsequently to the operation. In proof of this latter statement, a case is quoted in which it occurred, and which shows how advisable, if not absolutely imperative, it was to effect a removal of the testicle at the time of the operation. When it is remembered how often the testicle is atrophied in such cases, an additional reason is brought forward in favour of such a proceeding. (*Centralblatt für Chirurgie*, No. 1, 1883.)

# Notes and Queries.

ORIGINAL RESEARCH IN SANITARY SCIENCE.—First Quadrennial Discovery-Prize of £1,000, offered by the Worshipful Company of Grocers, London, 1883-1886.

Subject to the conditions of the Company's scheme, the Court now announces, as the matter of competition for this Prize, the following Problem :—

> " *To discover a method by which the Vaccine Contagium may be cultivated apart*
> "*from the animal body, in some medium or media not otherwise zymotic :—the*
> "*method to be such that the Contagium may by means of it be multiplied to an in-*
> "*definite extent in successive generations, and that the product after any number*
> "*of such generations shall (so far as can within the time be tested) prove itself of*
> "*identical potency with standard Vaccine Lymph.*"

The Prize is open to universal competition, British and Foreign.

Competitors for the Prize must submit their respective Treatises on or before the 31st of December, 1886 ; and the award will be made as soon afterwards as the circumstances of the competition shall permit, not later than the month of May, 1887.

In relation to the Discovery-Prize, as in relation to other parts of the Company's Scheme in aid of Sanitary Science, the Court acts with the advice of a Scientific Committee, which at present consists of the following members :—John Simon, C.B., F.R.S., John Tyndall, F.R.S., John Burdon Sanderson, M.D., F.R.S., and George Buchanan, M.D., F.R.S.

All communications on the subject are to be addressed to the Clerk of the Grocers' Company, Grocers' Hall, London, E.C.

*The Conditions of Candidature for the Prize are—*

Any person who desires to be regarded as a candidate for the Prize must deliver, or cause to be delivered, at the Hall of the Company, within the allowed period, a letter in which he declares himself to be a candidate for the Prize, and the treatise on which he bases his candidature : such letter, and such treatise, to be addressed to the Clerk of the Company, who will give a dated receipt for the same. The competition-treatise of a candidate may, if the candidate so prefer, be delivered in successive parts, each bearing its proper date.

Each treatise in competition for the Discovery-Prize must be an original work by the candidate who sends it in. It may be a treatise which he has published at any time within the allowed period, or may be a treatise which he has not previously published.

Although candidature is not restricted to any one nationality, all treatises, and all communications with the Company in relation to them, must be in the English language. Translations into English of competition-treatises published (within the allowed period) in a foreign language will be received on a like footing with treatises originally in English.

All treatises must be in print.

Each treatise must bear the name of its author.

Any particular candidate may be required to demonstrate practically to the Court, or to persons acting on their behalf, any fact or result which he claims to have discovered.

Candidature will be held to imply that the candidate undertakes to accept as regards himself the award which the Court shall make.

### *Award of the Prize.*

The Discovery-Prize being intended to promote the fullest possible elucidation of the given subject, the respective merits of candidates will be rated by that standard; and, if the Court be advised that the most meritorious candidate has produced an original solution of the main scientific problem or problems involved in the matter of the competition, the Court will award to him the entire Prize.

Should the Court be advised that no candidate has solved the main scientific problem or problems, but that valuable progress towards the object has been made by one or more of the candidates, or that collateral discovery valuable to sanitary science has been incidentally made by some candidate in his prosecution of the main research, the Court will apply such portion of the Prize as they may see fit in recognition of merits thus brought to their notice.

In estimating the originality of treatises, the Court will have regard not only to the state of knowledge which existed at the time when the subject for investigation was announced, but also to such later advances of knowledge as may have been made up to the time when the treatises were sent in.

Where two or more candidates equally claim to have made discovery in the subject-matter of the Prize, further information may be required of them in support of their respective claims, and the Court will judge between the claims as they shall think right. Each candidate will have been at liberty to notify to the Court at his own time any discovery which he believes himself to have made.

Neither the Prize, nor any portion of it, will be awardable to any person who has not formally declared himself a candidate for the Prize.

The awarding or withholding of the Discovery-Prize is to be entirely in the discretion of the Court, and the Company is not to be under any legal responsibility with regard to the same.

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## ERRATUM.

In the foot-note to Dr. Kent Spender's paper, p. 411, vol. xxx. *for* "Dr. Saundby," *read* "Dr. Sawyer."

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# Department of Public Health.

## CHANNELS FOR CONVEYING INFECTION TO HOUSEHOLDS: HOW THEY MAY BE RECOGNISED AND DEALT WITH.

BY R. THORNE THORNE, M.B. LOND., F.R.C.P.

(*A Lecture delivered at Cheltenham on March 15th*, 1883.)

(*Continued from* p. 480, vol. xxx.)

III. Although I have this evening only brought under your notice one method by which water can act as a vehicle for conveying infection to households, yet I feel sure that many other methods by which similarly mischievous results have been brought about will occur to your minds; indeed the amount of attention that has been given during recent years to water as a means for communicating disease, only finds its parallel in the series of investigations which led to the discovery that milk must be regarded as, at least, an equally important medium for the transmission of infection. I do not, however, propose to deal further with either of these two substances in the forms in which they are usually met, but I would ask your consideration to certain distributions of ice and cream, in contradistinction to milk and water, as forming channels by which disease may be conveyed to households.

I believe that the first instance in which the consumption of ice was shown to have been followed by an outbreak of disease, is that recorded in the *Seventh Annual Report of the State Board of Health of Massachusetts.* The occurrence took place in one of the large hotels at Rye Beach, an attractive and popular seaside resort upon the coast of New Hampshire. At the beginning of the season of 1875, some 1,000 visitors were assembled at Rye Beach, and a considerable number were attacked with a series of symptoms, including giddiness, nausea, vomiting, diarrhœa and severe abdominal pain, the whole accompanied by high fever, &c., which led to the suspicion that they had consumed some noxious article. The general sanitary circumstances of Rye Beach and the general distribution of milk were found to be in no way connected with the sickness; indeed, the fact that the incidence of the disease was entirely confined to 300 persons occupying one of the large hotels, made it clear that the source of mischief must be sought in some condition affecting these 300 people, to the exclusion of the remaining 700 who were distributed partly in another hotel, and partly in a number of neighbouring cottages. The sanitary state of the hotel is stated to have been exceptionally good, and although suspicion seemed at first to attach to the water-supply, yet the disease was found to have affected many who, "having apprehended trouble from the use of the water" which was strongly impregnated with salts of lime and magnesia, "had carefully limited themselves since their arrival to other beverages." Indeed, as the result of a careful process of elimination, suspicion came at last to be directed to the supply of ice furnished to the house. The ice when melted was found to give off a decidedly disagreeable odour, and the resulting water was both discoloured and charged with suspended matter; the atmosphere of the ice-house itself was offensive; and some persons who had used the ice away from the hotel were found to have suffered in the same way from violent illness. The ice in question had been derived from a local pond, the water of which was found to have become foul from long continued stagnation; one portion of the pond, measuring about 500 feet in length, and 150 feet in width, was occupied by "a homogeneous mass of putrescent matter," and the water when stirred up at this point was discoloured, black, and "emitted an intolerably offensive odour." A piece of ice carefully cleansed from all surface impurities, was then melted, and the water thus obtained was submitted to chemical analysis, the result being the detection in it of a quantity of "decaying organic matter." The use of the ice had also in the meantime been discontinued, and co-incident with its disuse "there was observed an abrupt amelioration in the symptoms of nearly all who had hitherto been ill." So also, no fresh attacks occurred during the remainder of the season.

The lesson to be derived from this history has an application wide enough to include our own country, where no sufficient attention is given to sources whence ice, intended for use in connection with our food supplies, is procured. Whenever a frost occurs it is a custom for costermongers and others to break up the ice on ponds and streams and to bring it into our towns, where it is stored for summer use, without so much as a thought as to whether the sources from whence it is derived are free from pollution. And even amongst the more educated classes there prevails an impression that even if water is subject to contamination, its noxious ingredients are eliminated by the process of freezing. Many experiments have, however, shown the fallacy of this view, some of the more recent having been made by Mr. C. P. Pengra, an American chemist, and being recorded by Dr. O. W. Wight in his *First Annual Report of the Board of Health of Detroit.*[1] In these latter experiments various organic matters (urea, albumen, &c.) were mixed with water, and the specimens were gradually frozen, the process being made to resemble, as far as possible, the natural process of freezing. A certain amount of purification did take place as the result; the diminution of organic matter in the ice amounting to 30 and even 40 per cent of that which was contained in the unfrozen liquid. But a large amount of the added pollution remained, and the investigator, though expressing surprise that the purification had been as great as it was, says that the experiments afford abundant proof that we ought not to tolerate the indiscriminate collection of ice, and he urges in conclusion that ice collected from waters containing decaying animal or vegetable matter, and from stagnant shallow pools or muddy streams, ought never to be used in connection with our food supplies, even if for no other purpose than that of packing poultry and various other fresh meats.

An interesting report on "The Dangers of Impure Ice" was last year published by the Committee of the Newport Sanitary

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[1] *First Annual Report of the Board of Health of Detroit*, by O. W. Wight, A.M., M.D., Health Officer, Detroit, Mich.

Protection Association,[1] and they arrived at the following, amongst other, conclusions. "Water in freezing undoubtedly frees itself from substances which in solution will necessarily give a fluid specific gravity greater than water alone, and also from those fluid substances which require a lower temperature for congelation. But even in these cases the frozen water retains traces of these substances more or less entangled throughout its mass, and solid particles floating in suspension or entangled in the ice, and these vary in size from a floating carcase, or fæcal matter, down to the extremely minute germs of infectious bacteria." In determining the question as to whether pond ice contains living germs, the Committee state: "Ice taken with great care from the centres of blocks and introduced into sterilised infusions of beef produced rapid putrefaction, thus giving a positive affirmative answer." And having regard to the conclusions at which they had arrived on the whole subject they allege that "there can be no doubt that whatever objection attaches to the use of contaminated drinking water, attaches equally to ice frozen from it. Indeed the objections would seem to be the greater to the ice. For dead organic matter entering water during the warm season, is decomposed and more or less used up to nourish plant and animal life; while in winter the low temperature preserves it, thus permitting an accumulation which, floating near the surface, may supply a more foul water for the ice."[2]

The experiences I have recorded do not, however, prove that the contagion of an infectious fever can withstand the process of freezing, and can therefore be conveyed by means of ice gathered from a specifically contaminated water. As to this, however, we are not left in doubt. Dr. Klein, F.R.S., in reporting to the Local Government Board on his recent artificial cultivations of the specific living organism, the *bacillus anthracis*, which produces anthrax in the lower, and especially in the herbivorous, animals, and the so-called "woolsorter's disease" amongst persons having to do with the hair of infected animals, says that the fatal efficacy of the organism is largely dependent on the formation of certain bright oval spores, and he proceeds to detail certain experiments which he made with a view of ascertaining whether these could be killed by freezing. "I have," says Dr. Klein,[1] "exposed in a capillary pipette fluid full of spores to the influence of ether spray, and having thus kept the fluid frozen for several minutes have injected it into the guinea-pig and rabbit with fatal result. I then subjected spores in the same manner to repeated freezing, each time for several minutes, the freezing being also carried out by the ether spray; but these spores nevertheless retained their full virulence. Before forty-eight hours were over the inoculated animals were dead of anthrax. I then placed a capillary tube filled with spores in a mixture of ice and salt, and kept it there for one hour exposed to a temperature of 12° to 15° C. below freezing-point (or 21° to 27° Fahrenheit below freezing-point); after thawing, the material was injected into the subcutaneous tissue of a guinea-pig. This animal died of typical anthrax on the third day."

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[1] For full text of this Report, see *The Sanitarian*, May, 1882. 113, Fulton Street, New York; or, European Agency, Trübner & Co., Ludgate Hill, E.C.

[2] See also, as to this subject, an article on "Impure Ice" in the *Fifth Annual Report of the Connecticut State Board of Health.*

As a further illustration of the extreme tenacity of life exhibited by the lower organisms I would refer to an article in the supplement to Ziemssen's *Cyclopædia of Medicine*,[2] where it is recorded that the same living organism has been subjected to a temperature of $-40°$ C. ($-32°$ Fahr.), a temperature never reached in our climate, and yet the frozen liquid has, on being thawed, remained as potent for self-multiplication and for harm as before. And further, it is also recorded in the same article that in Livingston Co., N. Y., animals had died of anthrax "while the temperature was below zero, after they had licked the frozen blood" from a boat on which the hide of an anthrax steer had been carried. Indeed, "no amount of cold" is believed to be "incompatible with the development" of this organism.

We are thus bound to accept the position that the morbific organisms, the introduction of which into the human system produces specific infectious disease, are not destroyed by freezing, and although the contagion of enteric fever, the one most likely to be conveyed to the human subject in ice, has not yet been discovered, we may infer from analogy that a water containing it is not rendered innocuous by freezing, but, on the contrary, that ice collected from an infected water and supplied to households would act as a vehicle for the introduction of the poison of that disease. In short, a wholesome ice can only be derived from a wholesome water.

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[1] "On the Relation of Pathogenic to Septic Bacteria, as illustrated by Anthrax Cultivations," by E. Klein, M.D. F.R.S., *Annual Report of the Medical Officer of the Local Government Board for* 1881, p. 202.

[2] See also *Acad. des Sciences,* Dec. 15, 1879; *Rec. de Méd. Vét.*, March 15, 1879.

I now pass to my last point. On the 9th of June 1875, a party of sixteen persons sat down to dinner at a house in South Kensington, and later on in the evening about 150 additional guests assembled with the family of the host and hostess in the drawing-room; the service of the house was also reinforced for the evening by seven extra servants. Within five days eighteen of the assembled guests suffered from more or less well-marked attacks of scarlet-fever; two others had "sore throats"; one of the waiters had scarlet-fever; and a few days later a lady not at the house on the 9th, but who lunched there the next day, was found to be suffering from a distinct attack of the disease. In all twenty-two persons were attacked.

The circumstances of the outbreak were investigated by Dr. Buchanan, F.R.S., and his report on it is specially instructive, as indicating the method in which such an inquiry should be conducted.[1] It was ascertained that the outbreak could not be regarded as simply part of a current diffusion of scarlet-fever in the neighbourhood; there was no common centre of infection or other common local circumstance to account in any way for the disease attacking those particular persons except the meeting at this particular house in South Kensington; and it was further seen that the condition causative of the disease must have been limited to the particular day, June 9th, or to that day and one or two days near it. It is certain that no scarlet-fever had existed in the household of the host and hostess, no recent scarlet-fever could be heard of in the persons or families of the guests, or in those of either the permanent or the occasional servants;

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[1] *Reports of the Medical Officer of the Privy Council and Local Government Board.* New Series, No. VII. 1876. (C—1508.)

nor indeed did the circumstances of the outbreak suggest infection from such a source. On the other hand, strong circumstantial evidence was forthcoming in favour of the infection having been communicated by means of some article of food or drink.

The dinner guests were the principal ones affected; several of the household who could not have touched any of the articles of food served up escaped altogether; there was a marked incidence of the disease on those who had several opportunities of eating certain exceptional articles supplied on that day; and a lady who look luncheon at the house on the following day was attacked. Up to this point, however, no one article of food had come under suspicion.

Two special supplies of cream were delivered at the house on the day of the entertainment; one which arrived at 4 p.m. was "double cream" from a London dairy and was used for ice-puddings, custards, and "creams"; the other arriving at 5 p.m. was from a Hampshire dairy, and was mainly used as cream. The latter supply was generally used by all the evening guests, amongst whom there was but little scarlet-fever; the former, or the four o'clock cream was distributed essentially to the family and to the dinner guests. It was again used at luncheon the next day, and thirteen persons who are known to have had opportunity of partaking of it suffered from scarlet-fever within five days. The bulk of this four o'clock cream was used in the preparation of articles which had to be boiled previous to their being used in a cool or frozen form, and those persons who alone partook of such articles were not specially attacked. But of this cream some that was in excess of the cook's requirements was put into at least one jug along with the five o'clock cream.

This mingling of the two creams added materially to the difficulty of the investigation, because it was that remnant of the four o'clock cream which had not been boiled previous to use to which interest was now found specially to attach. For "while the ice-puddings were eaten equally by those who were attacked and those who escaped, no less than seven ladies who were at the dinner and who took cream in their coffee in the drawing-room, afterwards became ill; none of them who took that cream having escaped." There was, however, no such incidence of disease on the gentlemen who took coffee down stairs. And further, whereas all who partook of cream on the day following the dinner were ill, none of those who did not partake of it suffered. Now it is known that it was the four o'clock cream that was used at the luncheon on the 10th, and if it so happened that the cream which was sent up into the drawing-room with coffee for the ladies who had left the dinner-table was the jug of mingled cream, then that four o'clock supply comes strongly under suspicion. Indeed, in addition to the evidence before obtained as to the extreme probability that the disease had been spread by some article of food, there was now seen to be a further strong probability that the particular article was the double cream from the London dairy.

The complicated nature of the conditions which had to be contended with in pursuing such an investigation in the metropolis forbade any conclusive demonstration as to the exact method by which this special cream supply may have become infected. It was however ascertained that upon one section of the London dairyman's customers there had been a large incidence of scarlet-fever, and a suspicious history as to scarlet-fever in the person of one of the dairy staff who was engaged in milking and in carrying out the milk was also elicited. In short, there is but little doubt that the cream supplied from this dairy was the vehicle by which the infection of scarlet-fever was conveyed to that household in South Kensington.

Some years ago I conducted a somewhat similar inquiry. The same disease had attacked a large proportion of persons who had met at a London dinner table, and the source of infection must have been some article of food. In this case fruit as well as cream came under suspicion, and the employment as strawberry gatherers of persons in the desquamative stage of scarlet-fever seemed as likely a source of infection as that which might have operated through the agency of a dairy. The circumstances were however too complex to be unravelled, and further inquiry was abandoned.

In considering each of the previous channels of infection I have pointed to some remedy. That which promises most in dealing with infection conveyed in the manner just indicated is the early isolation of persons suffering from the several infectious fevers. As the result of a lengthened inquiry which I recently made for the Government as to the Use and Influence of Hospitals for Infectious Diseases,[1] I ascertained that in districts where a suitable, reasonably attractive, and well-administered hospital had been provided, epidemics of infectious disease had unquestionably been prevented by the early isolation of the first persons attacked. In the course of that inquiry I had occasion to visit Cheltenham, and I found that as the result, first of a liberal bequest, and, later on, of the munificence of one whom it is still your privilege to number amongst your fellow-citizens, this town possesses in the Delancey Hospital an institution for the reception of infectious diseases, which as regards construction, attractiveness, and excellence of administration is not, so far as my experience goes, surpassed in this country.

In thus bringing under your notice a few considerations concerning some of the more important channels for conveying infection to households, I have been compelled, to a large extent, to deal with the mere rudiments of sanitary science. There are some here to whom the lecture can hardly have presented a single feature of novelty, but they, of all others, will be most ready to forgive its elementary character. It is said by one of the ancient prophets that the "people are destroyed for lack of knowledge," and the figures which I quoted at the beginning of my lecture will alone prove how vast a destruction of human life has resulted from ignorance of the first laws of health. If I have dealt with simple things it is because no language or illustration can be too simple to meet the lack of knowledge which has wrought such havoc in the past.

The future is, I trust, a hopeful one. Progress, even if it be slow, is being made on all hands; and favoured by such meetings as these, there is growing that sense of a common interest in matters relating to the health of the public, as distinguished from that of the individual, which is so essential to the physical, and indeed also to the moral, well-being of communities. If to-night one single forward step has been taken in this direction I am more than content.

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[1] *Supplement by the Medical Officer to the Tenth Annual Report of the Local Government Board*, 1882. (C—3290.)

31 21 (July-~~Aug~~ Dec) 1883

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## Original Communications.

# AN INVESTIGATION REGARDING THE ACTION OF STRONTIUM AND BARIUM SALTS COMPARED WITH THE ACTION OF LIME ON THE VENTRICLE OF THE FROG'S HEART.

BY SYDNEY RINGER, M.D.,
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AND
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These investigations were made to ascertain how far the chemical similarity between lime, strontium, and barium indicates a similarity in their physiological and, therefore, in their therapeutic action. Theoretically, we may say, if these substances are physiologically allied, we should expect to find that as strontium is chemically more akin to lime than barium is, that strontium in its physiological action ought to show a greater relationship to lime than barium shows to lime.

In testing the action of any substance on a tissue, as, for instance, the ventricle of the heart, the substance must be mixed with as simple a fluid as possible. If the substance in question is brought in contact with a complex fluid, like the blood, one of the constituents of this fluid may completely antagonise some of its effects. For instance, lime salts, when added to a saline solution, at first broaden the beat and later on greatly prolong dilatation, but a physiological dose of potassium salt will nullify these effects, so that, no matter how much of the calcium salt is added to the circulating fluid, it is impossible to reproduce either the broadening of the beat or the prolonged dilatation.

In testing how far strontium and barium affect the ventricle like calcium, we made a series of experiments with strontium and barium, similar to a series made some months ago with calcium salts, and published in the *Journal of Physiology.* We studied separately the action of the barium and strontium salts when added to simple saline solution. On the result so produced we then tried the modifying action of a potassium salt; next we tried the effect of a mixture consisting of saline solution, a calcium salt, and potassium chloride: and then the effect of a mixture consisting of saline solution containing a lime salt and potassium chloride and sodium bicarbonate.

In these experiments we used Roy's tonometer, by means of which fluid is made to circulate through the ventricle attached to a double cannula. The ventricle is inclosed in a glass vessel with a membranous diaphragm, which moves with each contraction of the ventricle, and by means of a lever the movement greatly magnified is recorded on a revolving cylinder.

These investigations were made in January and February.

The blood-mixture employed in these experiments was made by dissolving dried bullock's blood so as to represent normal blood, and this was diluted with two parts of saline, made with tap-water containing a minute trace of lime.

The saline solution contained 0·75 per cent. of pure sodium chloride.

The ventricle was tied on the cannula as near as possible in the auriculo-ventricular groove.

We first give a brief account of the effect of lime salts so that we may compare their behaviour with the behaviour of strontium and barium salts:—

A lime salt, as the bicarbonate or chloride, when added to saline solution, broadens the trace of each contraction and rounds its top; it soon delays dilatation, and if the contractions retain normal frequency then, owing to this increased duration of each contraction, much fusion of the beats ensues with some persistent spasm.

A physiological quantity of potassium chloride will remove all these effects.

With saline solution and calcium chloride, after half an hour to three-quarters of an hour the contractility of the ventricle grows less and eventually ceases, but the addition of a little sodium bicarbonate restores good contractions, though the trace is very rounded and much fusion ensues.

Without the presence of a lime salt in the circulating fluid the contractility of the cardiac muscle cannot, we find, be sustained; with any combination of the salts in the blood without lime the contractility, whether spontaneous or from artificial excitations, soon diminishes and disappears; further, a potassium salt, we find, is also necessary, for with saline solution and a calcium salt the contractility disappears in an hour, but will persist much longer if a physiological quantity of potassium chloride is present. Moreover, if the solution is neutral, though it contains sodium chloride, potassium chloride and calcium chloride in the right proportions, yet in about an hour and a half the spontaneous or induced contractions begin to grow weak; but we find that this diminished contractility is at once obviated by adding to the circulating fluid an alkaline solution, which, we suggest, neutralises the acid developed in the cardiac muscle, which acid is probably the cause of the weakening of the contractions.

An efficient circulating fluid for the maintenance of the heart's contractility must therefore be slightly alkaline in reaction and must contain, besides sodium chloride, a due proportion of lime and potassium salts.

Chloride of strontium behaves much like chloride of calcium, to which it is so closely allied chemically.

When 2 to 4 cc. of a 1 per cent. solution of strontium chloride is added to 100 cc. of saline, then, as with lime salts, the trace becomes much broader and the top much rounder, with acceleration of the spontaneous beats. Hence fusion ensues, and in addition there is some tonic contraction (contracture). When the ventricle beats unfrequently enough to prevent fusion, then decided delay in dilatation takes place. In from twenty to thirty minutes the contractions grow very weak, or contractility may be lost and contracture disappear, so that the trace recovers its early position to the base line. Then, on adding 4 to 5 cc. of a 1 per cent. solution of sodium bicarbonate to 100 cc. of the saline and strontium solution, as is the case with lime, spontaneous contraction, or contractility on stimulation, returns, but the trace becomes even broader than with saline and strontium alone, so that fusion again takes place also accompanied with some contracture.

So far, then, strontium salts differ from calcium salts only in one respect—strontium salts accelerate the beats whilst lime salts tend rather to retard them.

As with lime so with strontium—a small quantity of potassium chloride obviates the effect of strontium, diminishing the frequency of the beats, lessening their duration, removing contracture, and accelerating dilatation. Potassium chloride acts in the same manner when the contractions, grown weak with saline and strontium, have been strengthened by adding sodium bicarbonate.

If potassium chloride is added to the circulating fluid in quantity only just adequate to moderate but not to remove the influence of the strontium,[1] the trace then becomes greatly prolonged, in a far greater degree than I have ever seen lime produce. Diastolic dilatation is delayed, and often in the middle a kind of brief arrest takes place, or even an abortive contraction. This again I have never seen occur with lime.

The contractility of a ventricle fed with 0·75 per cent. solution of sodium chloride quickly declines and then spontaneously recovers to a great extent, or even completely; but in about twenty to thirty minutes it disappears. A suitable dose of a lime salt, as, for instance, calcium chloride, prevents the primary weakening and sustains contractility longer than with saline solution alone. Moreover, when with saline solution contractility has ceased, it returns and becomes good on the addition of a lime salt to the circulating fluid.

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[1] As, for instance, in the following combination: 100 cc. saline, 1 cc. of a 1 per cent. solution of potassium chloride and 2 cc. of a 1 per cent. solution of calcium chloride.

In both these respects the action of strontium chloride is similar to the action of calcium chloride.

Like lime, strontium constitutes a good circulating fluid. We replaced blood-mixture with a solution consisting of 100 cc. of saline solution, 4·5 cc. of a 1 per cent. solution of chloride of strontium, 6 cc. of a 1 per cent. solution of sodium bicarbonate, and 1 cc. of a 1 per cent. solution of potassium chloride, and ninety minutes after the substitution the ventricle beat nearly as well and the contractions remained of the same character as with blood-mixture.

We see then that strontium in almost all respects behaves like lime. It accelerates the beats more than lime; it also prolongs dilatation more. In all other respects lime and strontium agree in their action on the ventricle.

We next performed a similar series of experiments, with barium chloride, to the series just described with strontium.

We first tested the action of barium chloride added to saline solution. After taking a trace with blood-mixture, we replaced it by 100 cc. of saline solution containing 1 cc. to 2 cc. of a 1 per cent. solution of barium chloride.

Barium chloride prevents the great early weakening of the ventricle which ensues when simple saline solution is used to replace blood-mixture. In a ventricle not beating spontaneously it produces frequent spontaneous contractions, and in a ventricle beating spontaneously but unfrequently it increases the frequency of the contractions. It also broadens the beat, and this, with the great frequency of the contractions, causes fusion, with the induction of almost complete tetanus, even by small doses. Barium chloride also induces persistent spasm.

In most of these effects barium is like calcium and strontium, except that it accelerates the beats more than strontium, whilst calcium chloride often diminishes their frequency.

Potassium chloride obviates the prolonged dilatation induced by lime or strontium, and this is the case too with barium in small doses. Indeed, we get three different effects with potassium chloride, according to the quantity of barium chloride. With a small dose, as, for instance, 2 cc. of a 1 per cent. solution in 100 cc. of saline, 1 cc. of a 1 per cent. solution of potassium chloride entirely removes the contracture, the fusion of the beats, and the prolongation of diastolic dilatation.

With larger doses of barium chloride, potassium chloride (1 cc. of a 1 per cent. to the 100 cc. saline) removes contracture, prevents fusion by lessening the frequency of the beats, though dilatation is still much retarded, and for a short time even undergoes arrest; and during this arrest a partial contraction occurs, or even several, and then dilatation becomes complete. The contractions then grow weaker till contractility ceases.

After a large dose of barium chloride, as 1 cc. of 10 per cent. solution in 100 cc. saline, potassium chloride is unable to antagonise the barium effects, almost complete fusion persisting after the addition in successive doses of 5·5 cc. potassium chloride 1 per cent. solution. Sodium bicarbonate added (5 cc. 1 per cent. solution in 100) only made the fusion more complete, whilst the further addition of 10 cc. of a 0·5 per cent. solution of calcium chloride produced a marked effect. The fusion gradually diminished, and the trace gradually fell, till it occupied its original position, to the base line, and at last normal regular contractions ensued of the same character as at the beginning of the experiment, though the contractions were weaker, the trace being only half as high as that given with blood-mixture.

In this experiment, then, lime removed the effect of barium, and restored fair natural contractions. Calcium, therefore, has a stronger action in the ventricle than barium, unless barium is used in large quantities.

As with lime so with barium, when the ventricle, supplied first with saline and barium chloride, and then with potassium chloride, grows weak or stops, the addition of sodium bicarbonate improves or restores the beats. Thus we replaced blood-mixture by 200 cc. of saline containing 2 cc. of a 1 per cent. solution of barium chloride. The contractions at first became very irregular, then more regular, and then fusion and tetanus ensued. We then added some potassium chloride and the fusion ceased, but prolonged dilatation remained, and the contractions grew very weak, but on adding sodium bicarbonate they improved, though the prolonged dilatation continued. On the addition of calcium chloride the beats greatly improved, and became of the same character as the beats produced with blood-mixture, *i.e.* the lime removed the barium effects.

With lime or strontium salts added to saline solution containing a small quantity of potassium chloride, contractility persists for an hour or two, and much longer if the circulating fluid contains a small quantity of sodium bicarbonate. Indeed, a good artificial circulating fluid can be made with either calcium chloride or strontium chloride with saline solution containing potassium chloride and sodium bicarbonate.

This, however, is not the case with barium chloride, for numerous experiments show that with small doses of barium chloride the ventricle grows quickly weak and contractility soon ceases; whilst with larger doses fusion and contracture occur, so that the ventricle speedily passes into tetanus, and this fusion and contracture is not to be obviated by increasing the quantity of potassium chloride.

Indeed, numerous experiments show that it is impossible with barium to form a fluid capable of sustaining the contractility of the ventricle. Thus barium in this respect differs in its action from lime and strontium.

The difference between calcium chloride and strontium chloride on the one hand and barium chloride on the other is well shown in the following experiments, which we have many times repeated: —If 2 cc. of a 1 per cent. solution of barium chloride is added to 100 cc. of saline containing potassium chloride and sodium bicarbonate in appropriate proportions, the ventricle through fusion and contracture passes into tetanus, but then the addition of calcium chloride or strontium chloride to the solution entirely removes the barium effects, the fusion and contracture disappear, and good normal beats return, equal to the beats produced with blood-mixture.

Calcium chloride antagonises and suspends the effect of barium chloride; but an additional quantity of barium chloride overcomes the calcium chloride and barium effects reappear, but a further dose of calcium chloride again removes these barium effects, and so on, as we exemplify in the following experiment:—

First we took a blood-trace, and then replaced the blood by 200 cc. of saline containing 4 cc. of a 1 per cent. solution of barium chloride. The barium soon broadened the beat, increased the frequency of the contraction, and caused considerable fusion of the beats. We then added 1·5 cc. of a 1 per cent. solution of potassium chloride. This brought the trace down to its old position on the base line. Then we added some calcium chloride and only slightly improved the strength of the beat, which, however, became much stronger on the addition of sodium bicarbonate. The beats, however, were exceedingly irregular, but a further dose of calcium made them good and regular. Then we added some barium chloride to the circulating fluid (6 cc. 1 per cent. in 100), and the contractions soon became much more frequent and far weaker. We then added 8 cc. of calcium chloride, $\frac{1}{2}$ per cent. solution in 100 cc., and the beats became rather less frequent and much stronger. The addition of some more barium chloride again increased the frequency and diminished the amount of contraction, which once more improved on adding some more calcium chloride to the circulating fluid.

We next experimented to ascertain whether the calcium chloride molecule or the barium chloride molecule has the greater affinity for the ventricle. We used solutions calculated according to the molecular weights of these substances, so that in the same quantity of either solution we employed an identical number of molecules of each substance.

We added 1 cc. of a 2·08 per cent. solution of barium chloride to 200 cc. of saline, which produced acceleration of the beats with considerable fusion and contracture. We then added 1 cc. of a 1·1 per cent. solution of calcium chloride. This removed the barium effects, at least to the extent of suppressing the fusion and contracture. On adding another cubic centimetre of barium chloride solution, the fusion and contracture reappeared.

We again tested the effect of lime in antagonising barium. We replaced blood-mixture by 200 cc. of saline solution containing 2 cc. of a 2·08 per cent. solution of barium chloride, and 2 cc. of a 1 per cent. solution of potassium chloride. This quantity of potassium chloride is ineffectual to antagonise the effects of the dose of barium chloride, and consequently the contractions soon became spontaneous and frequent, with much fusion and contracture. Then we added 2 cc. of a 1·1 per cent. solution of calcium chloride, with speedy disappearance of the fusion and the contracture, the spontaneous beats ceased, and on excitation beats were induced very similar to those produced with blood-mixture.

Here, then, lime replaced the barium, whilst the potassium chloride, though unable to antagonise the fusion and contracture produced by the barium, yet obviated the effect of calcium on diastolic dilatation, hence the production of a normal blood-beat.

On another occasion we tested, in the way to be described, the antagonism between calcium and barium :—

We tested the action of pure saline ; of 200 cc. of saline containing 1 cc. of a 2·08 per cent. solution of barium chloride ; of 200 cc. of saline containing 1 cc. of a 1·1 per cent. of calcium chloride and 1 cc. of a 2·08 per cent. solution of barium chloride ; and 200 cc. of saline containing 1 cc. of a 1·1 per cent. solution of calcium chloride.

The barium solution produced a very marked effect on the ventricular contraction, greatly accelerating and broadening it, and effecting almost complete fusion.

The lime solution produced very little more effect than simple saline solution ; the trace became a little broad, the beats did not fuse, and the dilatation was a little more prolonged than with saline solution alone. The effects of the lime, compared with the marked effect of barium, were very slight. Barium chloride and calcium chloride solution containing the same number of atoms of each element, affected the trace much less than barium chloride simply, but in a greater degree than calcium chloride. The beats were accelerated and broadened, but not enough to produce fusion. Calcium, then, much antagonised the effect of barium.

Barium and calcium, as we have pointed out, have many actions in common. Both cause fusion and contracture, but barium in a greater degree than calcium. If both simultaneously operated on the heart, then as potassium chloride is singly unable to remove the effects of barium, still more so should it be impotent to antagonise the joint action of barium and calcium ; but we have seen that on the addition of calcium chloride to saline solution containing barium chloride and potassium chloride that fusion and contracture disappear, and the trace becomes like a blood-trace. The lime replaces the barium, and the potassium chloride is effectual in preventing the delay in dilatation, which lime, unantagonised by potassium, produces. The molecule of lime chloride therefore has a stronger affinity for the cardiac structures than the molecule of barium chloride.

It is interesting to observe that, although lime salts and barium salts both broaden the beat, causing fusion and producing contracture, barium salts effecting this more powerfully than calcium salts, yet when both a barium salt and a calcium salt are added to the circulating saline, the one does not increase the effects of the other, but lime takes possession of the muscular tissue, excluding the action of the barium salt.

It would seem then that two substances affecting the same tissue in the same way when administered therapeutically, one will not intensify the action of the other but will replace the other, and we get mainly the action of only one of the substances But although a molecule of calcium chloride will overcome and exclude the action of a molecule of barium chloride, yet by increasing the relative number of barium chloride molecules we can overcome the chloride of calcium action.

Next we sought to ascertain whether a lime salt or a barium salt, molecule for molecule, produces the greater amount of functional alteration in the cardiac structures.

In these experiments the chloride of calcium solution contained 1·1 per cent. of the salt, and the chloride of barium 2·08 per cent. of the salt, both being calculated irrespective of the water of crystallisation, which was carefully driven off by heat. We find that 1 cc. of the calcium chloride solution in 400 cc. of saline produces scarcely any effect on the ventricle, whilst 1 cc. of barium chloride in 800 cc. of saline produced decided barium effects. Hence, molecule for molecule, barium induces greater functional changes than lime, although lime has a greater affinity for the cardiac structures than barium.

Examined as to their individual action, the previous experiments have shown that a considerable similarity exists between the chlorides of calcium, strontium, and barium. This corresponds, we know, to a considerable similarity which chemically obtains for these three elements. We have further seen that physiologically the above salts contrast in respect of intensity of action. Thus, taking the extremes, we have seen that, molecule for molecule, barium chloride causes more functional disturbance than calcum chloride. This difference is marked and holds even for equal weights of the two salts, in which case we have just about half as many molecules of barium as of calcium chloride. This functional difference has again a corresponding chemical difference, for chemically the energy and basicity increase with the atomic weight, and barium stands as a considerably more energetic element than calcium.

A more complex problem appears when we come to consider the simultaneous action of two or more of the above salts. The results obtained are very interesting, and have considerable importance physiologically. Thus we have seen that barium and calcium both exert an influence in the same direction, but that the barium molecule is the more active. If however we bring both molecules into action simultaneously, we note that the resultant effect, instead of being greater than either component, is intermediate in its position, being greater than the calcium, but less than the barium effects. Instead of a summation we have to record an interference; the action of the one molecule clashes more or less with that of the other molecule. The importance of this subject in relation to practical medicine is very clear, for on the question of the combination of medicines we shall have to remember that the joint action of two drugs, functionally similar, is not necessarily greater than that of either separately. We shall have of course to remember that our very broad lines of classification into purgatives, astringents, &c., include agents most dissimilar in action, and shall not conclude that because practically a combination of aloes and colocynth, or of cassia-pulp and manna, is found more effective than either agent separately, that therefore interference (antagonism) cannot obtain between drugs having similar qualities. The doctrine of antagonism is a most important one, but as a rule we are accustomed to consider this as relating to agencies opposed in their quality of action. The above experiments however prove that it may apply also to the action of similars. The explanation of this antagonism of barium and calcium chloride is not very apparent, for, if we regard it as a case of displacement of the former by the latter, we meet with an apparent discrepancy in the fact that an element chemically more energetic and physiologically also more active, as experiments with the barium and calcium chlorides separately teach, in the fact that such should be turned out by a weaker element. Nor, indeed, would simple displacement account for all the facts of the case, for in the experiment in which an equal number of molecules of barium and calcium chloride were first tried singly and then jointly, the result in the latter case was not a simple reduction to the calcium chloride effect, but an effect intermediate between the two. Whatever, then, the explanation may be, the fact of *interference* remains.

There remains another point for discussion. It was noted that after the removal, say, of the barium effect by the calcium salt, the further addition of more of the barium salt brought back the barium effect, to be again removed by further increasing the dose of calcium. This dominance of action, according as the mass of the one or the other element dominates, is a fact of great importance to the physiologist; it is an example of what chemists term mass action, according to which they teach us that a substance incapable of effecting a decomposition in one proportion may become thus capable by simply increasing the proportion of this substance, all other conditions remaining the same. Thus, for instance, the compound water, which theoretically is a base, but of which quality we get ordinarily no evidence, —this same may be made to turn out a far stronger base by increasing enormously the relative proportion of the weaker base, the water, to the stronger base in question. Thus then the simple process of dilution may be made to effect chemical decomposition. This question, whilst individually it puts the substance water in a new light before us, opens up the whole subject of mass action, for, leaving special instances aside, it is clear that, if the chemists be right in their interpretation of the phenomenon, then simple dominance of mass, rather than by how much or by how little, is that which concerns us. All degrees may be expected in a scale ranging from bodies so unequally matched that the question of dominance becomes an impracticable one up to those so nearly balanced that a slight preponderance will turn the scale in one or other direction.

It is clear that the problem of estimating the action of a given compound in the presence of other compounds, becomes a very complicated one, and increasingly so as the number of elements present increases. Without further speculation on the subject of mass action, we shall have simply to remember that mass is an element in the problem, and the physiologist, dealing as he does with substances for the most part in great dilution, will have to bear in mind that under these conditions even water may become a factor of importance, instead of being the simple vehicle we have been accustomed to consider it.

However theoretical these points may at first sight appear, none could well be more practical if we are to advance from an empirical to a rational administration and combination of drugs. In a previous series of experiments we have seen that in the action of certain salts on the tissues, the question of percentage strength, rather than the actual quantity of the salt present, determines the effect, and that, after the percentage strength has reached a poisonous degree, the functions of the tissues may be restored by simple dilution. These effects, as has been already pointed out, indicate that the changes effected in the tissues by such salts cannot be very profound, nor the compounds formed very stable. It is possible that these phenomena may find their explanation in the mass action just considered, and that the water in these instances may be considered active rather than passive. As the matter at present stands, it is of little importance how the phenomena are named, but we must not forget that, in the chemistry of the tissues, interference or antagonism obtains even between salts similar in their action, and that the mass of the salt present is an element requiring consideration.

# ON SOME POINTS IN THE PATHOLOGY OF ANÆMIA, AND ON THE ACTION OF IRON AND ARSENIC.

BY FREDERICK WILLCOCKS, M.D. LOND., M.R.C.P.

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(*Continued from* p. 28.)

CASE VII.—Alice P., aged twenty-two.

*August* 8, 1881.—The menses commenced at about fourteen years of age and have always been regular. For the last two or three years she has become paler, and the menses have been scanty. Dyspnœa on exertion; bruit de diable in neck; no cardiac murmur. Face, lips, and conjunctivæ very pallid. No loss of flesh; fair appetite; no sickness or pain.

Ordered fifteen drops of Tinc. Ferri Perchloridi three times a day in an ounce of Quassia Infusion.

$$N = 3{,}880{,}000\,;\ G = {\cdot}48.$$

*August* 16.—Dyspnœa; appearance unaltered.

$$N = 5{,}370{,}000\,;\ G = {\cdot}35.$$

Large increase in the number of the corpuscles, but the individual value has diminished. Absolute colour of blood unaltered. Some of the discs are small, and a very few are distorted.

*August* 24.—Feels rather better. Breath still very short. She thinks she has a slightly better colour, but still looks very pale.

$$N = 4{,}850{,}000\,;\ G = {\cdot}38.$$

Absolute colour unaltered. N has fallen slightly and G has risen.

*August* 31.—Feels better. Still very pale; very slight improvement in appearance.

$$N = 5{,}100{,}000;\ G = \cdot 40.$$

Ordered Blaud's pills, three a day (each pill contained two and a half grains of sulphate of iron, and two and a half grains of carbonate of potash).

*Large and small doses of Iron in Chlorosis.*—Considerable difference of opinion exists as to the precise primary effects induced in the blood by iron treatment. Both Hayem and Melassez consider that the colour value of the corpuscles always exceeds from the outset the numerical, and that the rise in colour may be even accompanied by an actual decrease in the absolute number. On the other hand various English observers, Gowers,[1] Hunt,[2] Baxter, and myself, have published cases in which the primary influence has been chiefly exerted on the corpuscular number, and although the *total* hæmoglobin in the given quantity of blood has increased, the relative value of the individual globule has remained stationary or diminished. This discrepancy appears to me to depend partly on the dose and solubility of the iron preparation used, and partly on the extent of the primary corpuscular diminution in the given case. The *ultimate* effect of iron, in whatever dose it is given, appears to be practically the same in all cases; both the total hæmoglobin and individual corpuscular value are greatly increased, but it is only by carefully graduating the dose that we can distinguish the rise in number from the rise in colour.

Large doses were given in the first four cases of the present series. In the first case (Emma D——), Plate I., five grains of reduced iron were given three times a day; and both the number of the corpuscles (which was at first very low), and the colour rose rapidly. The corpuscles increased more than 1,500,000 in the first fortnight (700,000 per week), but the colour increase exceeded the globular, so that the relative value of the individual corpuscle rose in the same time from 0·34 to 0·45.

In the second case (Eliza B——), a very similar effect was produced by the same dose of reduced iron (gr. v. tds.). The corpuscles rose in a fortnight from 2,890,000 to 4,450,000, but the relative colour of the individual globule rose from 0·37 to 0·58. Both cases closely resembled one another at the outset, and it is a noticeable fact, that the improvement during the first fortnight on the same dose of iron, was very similar in both. The two effects of increase in the number of globules and increase in the colour occurred simultaneously under the influence of a large dose of iron, the latter being in excess; and it must be noted that in both the globular number was at first very considerably below the standard to which it subsequently rose under treatment.

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[1] *Practitioner*, July, 1878.

[2] *Lancet*, July 17th, 1880.

In the third case (Emily D——), Plate II., Ferri et Ammon. Citratis, gr. v. tos. was given, and the primary effect on the globules in the first fortnight was a slight reduction, but the relative colour rose rapidly in the same time from 0·40 to 0·60. Here the original number of the corpuscles had fallen to a comparatively slight degree below the average number ultimately attained after prolonged treatment.

In the fourth case, liquor arsenicalis ♏ v. tds. was given, for the first three weeks, without any perceptible improvement (see Chart iii.). She was put on iron (Ferri Redacti gr. v. tds.) on June 7th, and a very rapid rise of both *colour* and corpuscles followed *at once*, the former, however, being in excess. Between June 7th and June 21st, N rose from 3,920,000 to 5,780,000 and G rose from ·33 to ·43. The large primary rise in the number of the corpuscles is not, however, always maintained at the same standard, but the hæmoglobin value of the corpuscles continues to increase long after the highest numerical point has been reached. This fall in number after the primary rise on iron, is well seen in Case IV. and also in Case V., and is somewhat difficult to explain; it is possible that a considerable serous addition to the blood may occur subsequently to the corpuscular rise, and in consequence the fall may be more apparent than real, or possibly many of the newly added discs having a feeble colour and vitality, may be more rapidly disintegrated than normal forms.

We see, therefore, from the above facts, that, in cases where there exists a considerable diminution in the number of the globules, large doses of iron cause a simultaneous increase in the number and colour of the corpuscles, the latter outstripping the former from the outset, and continuing to increase long after the corpuscles have reached their highest numerical point. A reference to the tables shows that the value of the individual corpuscle in hæmoglobin (= G) increases from the *commencement* of the iron treatment, in the first four cases. When the corpuscles, as in Case III., are not much reduced below their normal standard, the effects of the iron are brought to bear almost entirely on the colour value, and the number may even diminish at first.

Comparatively small doses of iron were given in the last three cases (Cases V., VI., and VII.). In Case V. (Lizzie C——), Plate IV., the Tincture of the Perchloride of Iron was given in ten-drop doses three times a day for a period of six weeks, from Feb. 20 to April 3, and the very slow influence of the hæmatinic both on the colour of the blood, and on the appearance and symptoms of the patient, was in striking contrast to the effects produced in the former cases by *large* doses of iron. Although the number of the corpuscles increased very considerably in this case, the simultaneous increase in the total hæmoglobin was only sufficient to maintain them at their original colour value for the first four weeks, or in other words, the value of G remained constant. In the fifth and sixth weeks on this dose, G increased, so that after six weeks' treatment G had risen from ·34 to ·42 only. When the patient was placed on a large dose of iron (Ferri Redacti, gr. v. tds.) on April 3, the total colour rose rapidly, and during the next fortnight the value of the individual globule (G) rose from 0·42 to 0·56. The number of the corpuscles having attained its average maximum, did not further increase, and on April 17 a slight diminution was observed. It is a noteworthy fact that the new corpuscles added during the first four weeks (when the individual value was very low) were apparently smaller, and more easily distorted by reagents than normal forms.

In Cases VI. and VII. similar small doses were given, and the corpuscular increase was associated with an actual diminution in the relative hæmoglobin value. In Case VII. (Alice P——), the number rose (on xv. minim doses of Tinct. Ferri Perchlor. three times a day) from 3,880,000 on August 8, to 5,100,000 on August 31, but the value of G sank from 0·48 to 0·40.

In Case VI. (Julia P——) Plate V., (Tinct. Ferri Perchlor.

♍ 7½ three times a day), the number rose from 2,580,000 on August 17, to 3,830,000 on September 12, but the individual value fell in the same time from ·49 to ·37.

A similar case was reported by Dr. Baxter and myself in our former paper,[1] in which the number of red corpuscles increased in one month from 2,510,000 to 5,150,000, but the relative value fell from ·45 to ·28. A careful consideration of the foregoing facts suggests the inference that large doses of iron usually act in chlorosis by simultaneously increasing both the number and relative colour of the corpuscles, the latter being always in excess; while small, or possibly less easily absorbed doses, act chiefly by increasing the number, the relative hæmoglobin value remaining constant, or even undergoing diminution at first. If the number of the corpuscles has fallen but slightly below normal, the hæmoglobin increase may alone be noted. The ultimate effect, however, of *all* iron treatment in chlorosis is to increase the hæmoglobin value out of all proportion to the numerical, and this increase continues long after the corpuscles have regained their average numerical standard. These points fully bear out the well-known clinical fact of the great value of administering large doses of iron in all cases of chlorosis from the outset.

*Mode of Action of Iron.*—Apart from the influence of iron, the organism possesses an inherent power of corpuscular regeneration. Thus, as we have already stated, after fevers, hæmorrhage, and the like, new and feebly-coloured elements are added to the blood with more or less rapidity, and the normal numerical standard is attained at a period considerably before that at which the colour value becomes normal. According to Dr. Norris the red corpuscles become coloured in the blood by a gradual and successive assumption of equal increments of hæmoglobin, and consequently the oldest corpuscles are the most highly coloured. On this view the vitality of any given disc is directly proportionate to its colour value, and as the blood is in a continual state of change, new and faintly-coloured corpuscles are being continually added, to take the place of those destroyed.

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[1] *Lancet*, March 20th, 1880, p. 440, Observations 39, 40, 41. Laache specially refers to this case as being in opposition to his own and Hayem's results (*Die Anämie*, p. 42), but it is worthy of note that in this instance, only twenty-minim doses of dialysed iron were given four times a day. In the succeeding case (Annie R——) in the same series, Blaud's pills were given, and in a fortnight the number increased from 4,130,000 to 5,990,000, and the relative hæmoglobin value from ·28 to ·37. These two cases, therefore, strikingly exemplify the difference in action of small and large doses of iron, and they first suggested to me that the key to the difference among observers lay in the size of the dose given in the particular case. Laache appears to have treated none of his chlorotic cases experimentally by small doses; the large majority were treated with Blaud's pills, on Niemeyer's principle.

In chlorosis the majority of the red corpuscles are young and undeveloped, and never attain their full hæmoglobin value. There is no reason to suppose that there is any impairment of corpuscle formation in this affection, since in many cases their number is but slightly reduced, and even in cases in which the number is much diminished, probably the excessive vulnerability of the young new forms accounts for the diminution.[1] Certain points in connection with the relapse of chlorosis, to which I shall refer later, appear to bear out this point.

In view of these facts the question arises, whether iron in anæmia *directly* stimulates the formation of new corpuscles, or whether it *indirectly* increases their number by promoting the formation or absorption of hæmoglobin, thus improving the vitality of the new globules which are being constantly added to the blood by the normal processes. The latter view appears to me to be the more correct, and to more completely reconcile the conflicting statements of various observers.

In the first place, a normal power of corpuscular formation exists quite independent of iron.

Again, an increase in the mere number of the corpuscles, although a frequent, is not an invariable result of the exhibition of iron. In some cases of chlorosis treated with iron (*vide* Case III. Emily D———) the number of corpuscles may remain stationary, or even diminish slightly at first, although the colour value rises from the outset. Similar cases have been recorded by Hayem. The corpuscular number is here but slightly below the average normal standard, and consequently the vitality of the existing forms is alone improved.

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[1] Without entering into the question of the origin of the red globules, whether from colourless discs (Norris), or hæmatoblasts (Hayem), my hæmometric observations seem to show that young, new corpuscles are not only more feebly coloured, but also smaller and more easily acted on by reagents than fully matured forms.

In the severest forms of anæmia—the so-called pernicious or essential—in which the normal power of globule regeneration appears to be at a standstill, or almost entirely abolished, iron has no influence in increasing the number of the corpuscles.[1] For, since the natural addition of young forms is almost entirely suspended, iron cannot, on our present hypothesis, indirectly increase their number by improving their vitality and hæmoglobin value. In other words, when nutrition is much impaired, and the normal supply of new corpuscles greatly diminished, iron has little or no influence in increasing the number of discs in the blood, although it may continue to increase the hæmoglobin value of the individual forms already existing in it.

Attention has already been drawn to the different primary effects of small and large doses of iron in chlorosis. On a smaller or on a less easily absorbed dose the corpuscular increase may be well marked, while the individual hæmoglobin value remains constant, or may even fall at first. On larger doses both the number and relative value increase, the latter however being out of all proportion to the former. According to our present hypothesis, in the former case the small dose is merely sufficient to improve the hæmoglobin value of the new corpuscles slightly, and it therefore causes an increase in the vitality, and consequently indirectly causes an increase in the number of discs existing in the blood, without causing any marked increase in their relative hæmoglobin value at first. A large dose, on the other hand, increases the relative hæmoglobin value much more rapidly, and it therefore exceeds the numerical value from the outset. On the smaller dose the process of repair more nearly resembles the natural process, in which the increase of corpuscles precedes the increase in hæmoglobin. The ultimate effect, however, of both large and small doses, is practically the same; the relative colour value is greatly increased.

*Chlorotic Relapse.*—Reference has already been made to the remarkable tendency to relapse exhibited by many chlorotic cases after the cessation of iron treatment. A patient, apparently well, may within two or three weeks after the withdrawal of iron have a return of her previous symptoms—pallor, dyspnœa, palpitation and the like—and the blood also may rapidly return to its original condition. In the case of Emma D—— (Chart I.) the relapse occurred on two occasions, and the blood was carefully examined throughout. I have been unable to find any other hæmometric observations to compare with my own on this point. The patient was treated with reduced iron, five grains being given three times a day for a period of nine weeks, from September 9 to November 11, and was to all appearance well; her colour was good, and the dyspnœa and palpitation on exertion had disappeared. She was then put on five drops of the Liquor Arsenicalis, three times a day, and the dose was increased to four times a day on December 2. During the first week the blood remained practically constant both as regards its total colour and the number of corpuscles, and the menses appeared as usual on November 25. A fortnight later, on December 2, the corpuscular number was still at the same point, but a slight decrease in the total colour was observed. She felt well, with the exception of slight nausea on one or two occasions, and her appearance was good. The arsenic was now given four times a day, and a fortnight later (December 16) a very decided fall both of the number of corpuscles and of the total colour had occurred. The numerical fall was however proportionately greater than the fall of colour, so that the value of the individual corpuscle rose slightly ($G = 0{\cdot}72$). She was much paler, both the lips and conjunctivæ showing a decided decrease of colour; she had a general feeling of malaise, and complained of aching in her limbs, and dyspnœa. Here within the last fortnight both the absolute colour and number of the corpuscles had considerably diminished, but the numerical fall had been in excess of the colour diminution, so that the value of the individual disc (G) had risen slightly. This would appear to show that the more feebly coloured elements had disappeared in the interval when no iron was given; a fact which forms an additional argument in favour of the view that iron increases the total number of corpuscles indirectly, by increasing the colour value of the young elements which are continually added to the blood, and thereby improving their vitality. The relapse was stopped at this point, so that the subsequent diminution in the value of the individual disc (G) which occurred in the second relapse, was prevented.

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[1] *Vide* Appendix for cases of "pernicious" anæmia.

The arsenic had not produced any characteristic symptoms of nausea, vomiting, diarrhœa, &c., in the preceding fortnight, and the relapse could not have been due to its action, since a similar relapse occurred later, when no arsenic was given. Possibly the drug may have retarded the onset of relapse, as no symptoms of it appeared for more than three weeks, while on the second occasion the onset was more rapid. A test series of observations on a healthy organism with arsenic gave a negative result.

The patient was again placed on iron (Syrup. Ferri Iodidi, ʒ j. tds) on December 16, and her symptoms rapidly disappeared. This treatment was continued up to April 29 (four months), when her appearance was good, and all symptoms had disappeared for a considerable period. The absolute colour had, however, never quite reached so high a standard as on the previous treatment with five-grain doses of reduced iron. On April 28 the iron was again omitted, and a quinine mixture (Quiniæ Sulph. gr. j.) substituted. In the following week a considerable rise in the number of corpuscles was observed, with only a very slight rise in the total colour, and consequently the value of the individual disc fell. This rise had probably no connection with the change of medication, but was merely a normal oscillation, similar to those which had previously occurred in the intermenstrual epochs, and to which I shall presently refer. In the following week both the number and colour fell considerably, but the primary fall in number was here again in excess of the fall of colour, and consequently the individual value rose slightly. All the young, feebly coloured additions of the previous week had disappeared. The relapse was more rapid than on the previous occasion, but it should be observed that the iron was omitted soon after the menses, when both the total number and value were at their lowest. During the next two weeks (May 19 and 26) while the number remained constant, the fall in colour continued, so that the individual value became much lowered. Coincident with the diminution of the value of G, the small forms, commonly found in untreated cases of chlorosis, began to appear. These varied in size from 2·85 μ to 5·7 μ, and were probably new and feebly coloured additions, taking the place in the normal evolution of the blood of the older and more highly coloured forms, and unable in the absence of iron to attain their full development. With the diminution of colour and corpuscles all the patient's early symptoms returned; dyspnœa on exertion, nausea, headache, giddiness, pains in the limbs, and the bruit de diable in the veins of the neck. The face and mucous membranes rapidly acquired the chlorotic tint. The subjective symptoms increased in severity with the advance of the relapse, and the whole train of chlorotic symptoms would therefore appear to depend primarily on the blood condition. On June 2 she resumed large doses of iron, being now placed on Blaud's pills, three to be taken three times a day, and she rapidly improved.

The great value of blood examination in detecting the commencement of relapse is obvious from the foregoing case. Although all her symptoms disappeared under iron treatment, the corpuscles never reached the average normal standard, and this, together with the large intermenstrual oscillations may have determined the persistent tendency to relapse in her case. It must, however, be remembered that the number consistent with health may vary very considerably in individual instances.

*Intermenstrual Oscillations.*—Considerable oscillations in the number of the corpuscles are liable to occur in cases of chlorosis treated on iron, both during the period of cure, and subsequently when the average number and colour have attained the normal standard. Dr. Hunt,[1] in a large number of observations on chlorotic anæmia, was the first to show that a definite numerical fall occurred shortly before the onset of the menstrual flow. My own observations have tended to confirm this fact, and on some occasions it has been possible to predict with certainty the onset of the catamenial hæmorrhage. Thus in Emma D—— (Case I.), a fall in number occurs on October 14 (three days before menstruation), and again on December 30 (day before). Later, between January 27 and April 29, when her condition was practically constant, and she took the same dose throughout, the premenstrual fall was even more marked. The corpuscular fall is not accompanied by a proportionate, or often not even by any fall in the absolute colour, and consequently the blood discs are richest in hæmoglobin just before the menstrual flow. She took a constant dose of iron from December 16 to April 29, and after January 27 was to all appearance perfectly well. The absolute colour of the blood also remained practically unaltered from that time up to the commencement of the second relapse, and there fore the numerical oscillations between January 27 and April 29 (three months), must have been quite independent of any disturbing influence exercised by the iron.

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[1] *Lancet*, July 17th, 1880.

Similar well-marked variations in number may be seen in Emily D—— (Case III.).

Usually the premenstrual fall increases slightly with the flow, but this does not always occur, and the number may even rise during the period (*vide* Emily D——, Case III., April 19, and April 26). In the intermenstrual period subsequent to menstruation, a considerable rise in the number of corpuscles occurs, without, however, any marked proportionate increase in the colour, and consequently the average individual colour-value falls. This is well seen in Case I. (Emma D——), on March 3, March 31 (?), May 5 and July 7. Small corpuscular forms which were absent before menstruation, become abundant with the increase of corpuscles. The individual value rises slightly as the month progresses, but as the period of the next flow approaches, the number again falls, but the individual value has then risen to its highest point. There appears then to be a definite cycle in the development of the blood between the menstrual periods. The order of events is as follows: at the end of the menstrual flow the number is at its lowest point, but the individual value is good; subsequently the number rises considerably, but without any definite rise in the absolute colour, so that the individual value decreases, and we assume, therefore, that the rise is due to the addition of young feebly-coloured corpuscles. The individual value in hæmoglobin gradually improves slightly, but the number falls considerably before menstruation, when the value of the individual disc is at its best. The new additions after menstruation become gradually improved in colour, and the diminution in number observed shortly before menstruation is probably due to a coincident increase in the serous part of the blood. These facts would therefore tend to show that the blood gradually develops after menstruation, at first by the addition of new forms, which gradually assume hæmoglobin, and that finally both the corpuscular and serous portions of the blood reach their highest point of development just before menstruation. The menstrual hæmorrhage reduces the whole mass of the blood slightly, and repair takes place as before. The blood condition immediately before menstruation closely resembles that of pregnancy, to which I have referred in a former paper.[1]

These large menstrual oscillations do not, as far as my present observations show, occur to the same extent in healthy women. In a case of mild hystero-epilepsy, aged 38, with regular but somewhat profuse menstruation lasting nearly a week, the blood was examined frequently throughout a menstrual epoch, but the flow appeared to produce comparatively slight alterations in the composition of the blood. It is probable that in older, and healthy women, the organism is better able to bear the recurring hæmorrhage, and that the reparative process is more gradual, and more effectual.

In both Emma D—— (Case I.) and Emily D—— (Case III.) the menses when re-established by iron treatment were somewhat profuse, lasting for some days, and the hæmic oscillations were well marked. On the other hand, in the case of Lizzie C—— (Case V.), in whom the menses were never properly re-established, the periodic oscillations were unobserved, or comparatively insignificant.

These facts tend to show that the power of corpuscle formation in chlorotic anæmia is good, and that there is an excessive and abnormal demand for hæmoglobin in the intermenstrual periods, apparently induced by the periodic hæmorrhage. If this demand is not met (as it was in the above cases when they were on iron), a large number of feebly-coloured elements will be added to the blood in the normal process of repair, to replace others destroyed, the value of the individual disc will gradually diminish, and the blood must gradually assume the chlorotic character already described. How far the small, repeated, menstrual hæmorrhages may be *directly* productive of the chlorotic state in some cases it is difficult to say, but obviously they cannot be the cause of the affection when it occurs before the onset of menstruation.

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[1] *Lancet*, December 3rd, 1881, "Comparative Observations on the Blood in Chlorosis and Pregnancy."

Most frequently the menses have been more or less imperfectly established for some time, and then some sudden or painful emotion, exposure to cold, to bad hygienic surroundings or the like, may act as the direct precursor of the attack. In other cases no obvious cause can be assigned, and in a few cases the menstrual flow has not been established at all.

All that can at present be fairly inferred from the foregoing observations is, that chlorotic cases are liable to considerable periodic fluctuations in the quality of their blood from comparatively trivial causes, which produce little or no effect on the healthy or more developed organism. The equilibrium between corpuscular production, and the production or absorption of hæmoglobin, is unstable. Moriez considers chlorosis to be essentially a disease of evolution, and possibly the instability above described is present to a greater or less extent in all young women at the time of sexual development; consequently chlorotic anæmia may be induced at this epoch by causes which would be inoperative at other and later periods of life.

## CASES OF INTENSE ANÆMIA (ACUTE, PERNICIOUS, OR ESSENTIAL).

CASE I.—Jane K——, aged 50, was admitted into King's College Hospital, under the care of Dr. Duffin, on June 3, 1880.

She had always enjoyed good health with the exception of occasional bilious attacks. Six children; one born dead; the last child born seven years ago. The menses ceased three years ago, but vaginal hæmorrhage recurred, together with epistaxis, three months ago, when her present illness commenced, without any apparent cause. She then began to vomit frequently, and has gradually become very pale. At present her skin is of a pale, yellowish colour, closely resembling slight jaundice, but the conjunctiva is pearly white. The mucous membranes are very pallid. The temperature ranges between 99° F. and 100° F. Pulse 120 per minute. A systolic bruit is audible, loudest at the base of the heart, and loose crepitation at the bases of the lungs. There is slight œdema of the feet, which commenced a week before admission. She complains of dyspnœa, pain in her loins and hepatic region, and of indigestion, but there is no marked emaciation. The urine is acid, of specific gravity varying from 1010 to 1015, and contains no albumen. The patient had taken no medicine for some time before admission.

*June* 9.—

$$N = 510,000\ ;\ G = 1{\cdot}16.$$

She was subsequently placed on iron, but her symptoms gradually became more severe, and she finally died on June 13.

No coarse lesion could be discovered on post-mortem examination. Both pleuræ contained some serous fluid, and the lungs were very œdematous. The pericardium contained about three ounces of fluid. Well-marked light buff-coloured striæ were visible on the columnæ carneæ, and musculi papillares, and the muscular tissue of the heart was distinctly granular on microscopical examination. The cortex of the kidneys was not wasted; the epithelium of tubules was fatty. The other organs looked pale, but were otherwise normal.

Case II.—Caroline F——, aged 37, was admitted into Charing Cross Hospital on June 23, 1882.

She has been married for five years, but had no children born alive. She has had four miscarriages, attended with considerable hæmorrhage, and has never been pregnant for more than four months at a time. She thinks she had an abortion about six weeks ago, as previously she had seen no menses for two months. She has never had a very good colour, but was always healthy before marriage; soon after hæmorrhage set in, which lasted for about five weeks. The menses commenced at sixteen years of age, and she has no recollection of any pallor or amenorrhœa when she was young. At the age of twenty-nine she had amenorrhœa for six months, and became very pale; she took medicine and got better.

For the last nine or ten months she has gradually lost her colour. Vomiting set in about four months ago, and the pallor has much increased since. In her previous pregnancies vomiting has always been severe, but of late it has occurred at any period of the day, and her appetite has entirely failed. On admission, her skin was of a well-marked yellowish, pallid tint, she was very sallow, and the lips and conjunctivæ very pale. The ocular conjunctiva had a faint yellowish tinge, probably due to subconjunctival fat. She was slightly emaciated, but there was no œdema of the feet or legs. Sickness was almost constant, but she could occasionally keep down a little milk or beef tea, and with this exception she had scarcely eaten anything for the last two months. The temperature varied between 100° F. and 102° F. A very faint systolic blowing could be heard, loudest at the apex, but there were no other cardiac murmurs. The lungs were normal. A continuous venous hum (*bruit de diable*) could be heard on the right side of the neck, but only a systolic sound was audible on the left side. There was slight tenderness over the stomach, but the abdominal viscera appeared otherwise normal. The urine was highly coloured, acid, of specific gravity 1015, and free from albumen on admission, but contained a slight trace on July 7 and 10. The sight has been somewhat dimmer since the beginning of the present year; the eyes were examined by Mr. Leahy, who found a patch of old retinitis in the right eye, but no hæmorrhages. For several months before admission she had taken large and continuous doses of various iron preparations, as well as strychnia and quinine, without any perceptible benefit, and the pallor and vomiting had gradually become worse. She was, on admission, at first placed on a Bismuth mixture, but the vomiting continued unrelieved.

On July 2 she was ordered a mixture of Liquor Arsenicalis, ♏ iv. in cinnamon water, to be taken three times a day. The blood was first examined on July 3, with the following result:—

$$N = 560{,}000\ G\ ; \ = 1{\cdot}15.$$

The corpuscles are not distorted, and the majority are oval in form when seen in the diluting solution (Gowers'). Their diameter varies from $7{\cdot}1\mu$ to $9{\cdot}1\mu$, many being decidedly larger than normal. A considerable number of minute, highly refracting particles are also seen in the field; some of these are less than $2{\cdot}85\mu$ in diameter, others about $3\mu$.

*July* 10.—The lips are of a pinker colour, and there is a slight improvement in the colour of the cheeks, but the conjunctiva is whitish, and the skin still remains sallow-looking. She feels much better; the vomiting ceased very soon after the arsenic was given, and has not recurred since. She now eats well, and has been on fish diet for some days. A continuous hum can still be heard on the right side of the neck, a systolic sound only on the left side. There is no definite cardiac *bruit*, but the first sound at the apex is somewhat softened. Temperature in the axilla, 100° F. The urine contained a slight trace of albumen, was acid, and of specific gravity 1015.

$$N = 750{,}000; \ G = 1{\cdot}38.$$

Many of the corpuscles are very large, and their diameters vary considerably, ranging from $5{\cdot}7\mu$, $7\mu$, $8{\cdot}5\mu$, to $11{\cdot}4\mu$, when examined in Gowers' solution.

*July* 17.—She feels much better, but is still very weak; she has been able to get up for a short time, which caused slight œdema of her feet. The lips are a better colour, but are still pale, as well as the conjunctivæ. The face is still sallow. The temperature ranges from 100° F. to 101° F. The *bruits* in the neck remain unaltered, and a questionable soft systolic blowing is still audible at the apex of the heart. She continues to take the arsenical mixture.

$$N = 900{,}000; \ G = 1{\cdot}38.$$

A few large, granular-looking red discs are $11{\cdot}4\mu$ in diameter, others are $9\mu$, $8{\cdot}5\mu$, and many are $7\mu$. The corpuscles as a whole look large, and small forms are absent.

*July* 27.—Feels much better, and has been out for a walk, but still looks very sallow. Appetite good. The *bruit de diable* on the right side of the neck somewhat fainter. Temperature, 100° F.

$$N = 1{,}110{,}000; \ G = 1{\cdot}21.$$

The white corpuscles are 1 to 100 red. The red corpuscles are on the whole large, the most numerous are $10{\cdot}5\mu$, $9\mu$, and $8{\cdot}5\mu$ in diameter. Other forms, $6{\cdot}2\mu$ and $5{\cdot}7\mu$, are fairly numerous, and a very few are about $4\mu$. Minute particles under $3\mu$ in diameter are numerous.

*August* 7.—She looks about the same, but feels much stronger. The temperature in the morning was 98·6° F., in the evening 99·6° F. Seven grains of citrate of iron and ammonia had been added to the arsenical mixture two days previously. The *bruits* in the neck remained unaltered, and a faint blowing was audible at the base of the heart to the left of the sternum :—

$$N = 1{,}330{,}000\ ;\ G = 1{\cdot}13.$$

The red corpuscles were fairly large, and of various diameters, as $9\mu$, $8{\cdot}5\mu$, $7\mu$, $6\mu$. Smaller corpuscles were not numerous, and the minute particles (hæmatoblasts) almost absent.

The patient was discharged on August 11, feeling fairly well. She was seen once subsequently, when her appearance had not markedly improved, but she felt strong and was able to walk about.

CASE III.—Louise E., aged 32, was admitted into Charing Cross Hospital, under Dr. Green, on March 13, 1882.

She was married at 20 years of age, and has had three children born alive. Three and a half years ago she had a miscarriage, in which she lost a considerable quantity of blood, and has never regained strength since. About two years ago she began to suffer from severe pain and swelling in her legs, vomited frequently, became emaciated and lost her colour. For the first three months the vomiting was almost incessant, and she ate scarcely anything. A year ago the symptoms improved, her appetite returned, and she was able to walk about, but the sallow colour of her skin has much increased during the last eight months. No menses have appeared for the last twelve months; previously they were regular but scanty. At the commencement of the present winter she again fell ill with palpitation and shortness of breath, and came under Dr. Green's care at the Brompton Hospital. As a young woman she had always enjoyed good health, and always had a good colour.

On admission she was excessively pallid, and almost corpse-like in appearance; the skin was of a rather yellowish sallow tint, the ocular conjunctivæ pearly white, and the lips bloodless. She was somewhat emaciated, but not to a marked degree. A loud systolic murmur was audible over the cardiac area, and a systolic *bruit* could also be heard on both sides of the base of the neck synchronous with the cardiac sound, but there was no continuous hum in the jugular veins. A systolic *bruit* was also audible over the closed eyelids, but was not continuous. The lungs were normal. The urine was about normal in amount, of a rather deep colour, not cloudy, acid in reaction, of specific gravity 1009 to 1014, and occasionally contained a trace of albumen (March 17 and 20). The bowels acted freely, and the motions were light coloured. The average temperature ranged between 100° F. and 103° F., but was very irregular, falling to normal on two occasions. The pulse varied from 108 to 130 per minute.

She was ordered a mixture containing ten grains of citrate of iron and ammonia, three times a day, and a teaspoonful of cod-liver oil twice a day.

The blood was first examined on March 16 (three days after admission)—

$$N = 732{,}000\ ;\ G = \cdot 96.$$

The white corpuscles were relatively increased in number, averaging 1 to 150 red. The red corpuscles were enormously diminished, the number given above being the mean of five observations. Both larger and smaller forms were more abundant than in normal blood, the former being in excess, and accordingly the average corpuscular diameter was increased, being as high as $8{\cdot}47\mu$. Many of the red corpuscles were very large, a few being as high as $12{\cdot}6\mu$, when examined in ·75 per cent. salt solution. The majority of the red discs were unaltered in form, but a few were greatly distorted. A very few round, highly-refracting particles, less than $2{\cdot}85\mu$ in diameter, were also visible (hæmatoblasts). The increase in the size of the corpuscles was associated, as in the two previous cases, with a high relative hæmoglobin value.

On March 18 the iron was ordered to be given every six hours, and the blood was again examined on March 21. As the mean of four observations, the number of red corpuscles was found to be 530,000 per cubic millimetre, and the relative hæmoglobin value of the individual corpuscle had risen to 1·27. The majority of the corpuscles were large and not misshapen, and only a few small forms were present. The white corpuscles were in the proportion of one white to seventy red.

On March 22 the iron was discontinued, and she was placed on Liq. Sodæ Arseniatis ♏v., Sp. Chlorof. ♏v., Aq. ad ℥j.; to be taken three times a day. Severe vomiting recurred on the following day, and she became rapidly weaker. The arsenical mixture was discontinued on March 28, and a mixture of Liq. Morphiæ Hydrochlor. and Bismuth given. The vomiting somewhat lessened, but she finally died on the evening of April 4. A numeration made on the morning of April 4 gave the red corpuscles as 720,000 per cubic millimetre; their size and general appearance remained unaltered.

The following notes are taken from the record of the post-mortem examination, made by Dr. Colquhoun:—

Body rather emaciated; surface bloodless and pale; blood thin and watery-looking. *Heart* pale, weight 11 oz.; valves normal; few thready coagula in left ventricle; fatty deposits near the aortic valves in the aorta. *Lungs*, weight 2-lb. 14-oz.; middle lobe of right lung solid, greyish, and partly red from recent pneumonia; rest of both lungs normal. *Spleen*, weight 10-oz.; firm, appears normal. *Liver*, weight 67-oz.; enlarged, but looks normal. *Kidneys*, weight of two 15½-oz.; pale, capsules non-adherent. The marrow of the tibia was examined; it was red-looking, no fatty globules were visible microscopically, but its cellular elements presented no abnormal appearances.

These cases present some remarkable features, which serve to distinguish them from the ordinary forms of anæmia. The red corpuscles are enormously diminished in number, but both their average diameter and hæmoglobin value are largely increased. In the third case (Louise E.), some of the corpuscles were as high as $12{\cdot}6\mu$ in diameter, and the average diameter taken from a very large number at random, and from several specimens, was as high as $8{\cdot}47\mu$; and in the second case (Caroline F.), the individual hæmoglobin value was at two examinations upwards of 1·38, by Hayem's scale.[1] The majority of red corpuscles, therefore, exceed the normal, both in size and in the amount of hæmoglobin which they contain. This relative hypertrophy of the red globules (*globules géants*) has been described by Hayem as occurring in most cases of very severe non-traumatic anæmia, and he explains their presence by supposing that in cases characterised by a great diminution of the red discs, these elements have a longer survival, and consequently attain a larger diameter, and a higher physiological value.[1] A large number of bright-looking, rounded bodies were seen scattered through the field in the two latter cases, but they were not noted in the first case. Many of these bodies, which were formerly regarded by Eichhorst as being pathognomonic of "essential," or "acute pernicious" anæmia, were upwards of $3\mu$ in diameter, and tended to group themselves in masses of two or three; others were isolated, but none of them appeared to be at all tinted with hæmoglobin. Professor Hayem considers them to be hæmatoblasts, which tend to accumulate in the blood in all severe cases of anæmia, undergo hypertrophy, and become slightly tinted with hæmoglobin (Hayem, *ib.* p. 276).

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[1] I have to thank Mr. Shaw, B.A., Demonstrator of Physiology at Charing Cross Hospital, for much kind assistance in the microscopic examination of these cases.

As regards the clinical aspect of these cases, no definite history of chlorosis in youth could be obtained, but in the second case amenorrhœa and pallor came on for six months at the age of twenty-nine. In this case the exciting cause appears to have been a series of miscarriages attended with considerable hæmorrhage. The peculiar, pale lemon tint of the skin was very marked in all, and might easily have been mistaken for slight jaundice, if the conjunctiva had not been examined. Vomiting was very severe, and in all there was an irregular, elevated temperature, but emaciation was in no case extreme. The administration of iron was useless, and did not avert the fatal termination in either the first or third case, although, in the latter, it at first tended to raise the individual hæmoglobin value from ·96 to 1·27, while the red corpuscles decreased in number. In Case II., iron had been given for three or four months before admission in various forms and in large doses, as well as quinine, strychnia, carbonate of bismuth, salicylate of soda, and dilute mineral acids, but the pallor had gradually increased. The iron had been administered in the form of Liq. Ferri Perchlor. (♏x. tds.), Mist. Ferri Co. (℥j. tds.), and Sulphate of Iron (gr. j. with quinine tds.). On admission (June 23) she was placed on a bismuth mixture, but with no relief to the vomiting, and nine days afterwards she was placed on a mixture containing four minims of Liquor Arsenicalis, to be taken three times a day. The vomiting almost immediately ceased, appetite returned, and her appearance and the condition of the blood gradually improved. The red corpuscles more than doubled in number between July 2 and August 7, but at first the individual value increased more rapidly than the number, though it subsequently fell somewhat. At the time of discharge, however (August 7), the individual hæmoglobin richness still remained above normal. The increase, noted in this case, of the relative hæmoglobin value of the corpuscles from 1·15 to 1·38, while the patient was on arsenic, is of importance in connection with Hayem's explanation of the high relative colour-value observed in the most severe forms of anæmia. He has attributed it to the iron, which has almost invariably been given in large quantities before the case comes under observation. In the present case the rise took place while the patient was on arsenic, and in the first case (Jane K.), no medicine of any kind had been given for a considerable period before admission, and yet the individual richness was as high as 1·16.

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[1] *Leçons sur les Modifications du Sang*, Hayem, 1882, p. 282.

Iron not only does no good in these cases, but is actually harmful by acting as an irritant to the stomach, and thus promoting and keeping up the incessant vomiting. The concentration of the colouring-matter in a very few large corpuscles, which appears to be the most prominent feature in the severest forms of anæmia, is probably due to a natural process of compensation, by which the respiratory function can still be carried on, even though the corpuscles are reduced ten or twelve times below their normal number per cubic millimetre. How far the rapid abatement of the vomiting in Case II. was due to the influence of the arsenic, or to the cessation of the remedies previously administered (bismuth, iron,) is difficult to say, but in Case III., where arsenic was administered at a late period of the disease, the sickness continued unchecked.

In severe anæmia, either the power of corpuscle formation is almost entirely abolished, or young corpuscles, if formed, have little or no power to absorb hæmoglobin, and consequently do not reach their full development. The comparatively large size, which the hæmatoblasts attain, without the absorption of any appreciable quantity of colouring matter, would go far to show that the embryonic corpuscles are more or less abortive. Iron in these cases is useless beyond a certain point, the existing corpuscles being already overcharged with hæmoglobin. These facts forcibly bear out the hypothesis enunciated at an earlier page, as to the probable hæmatinic action of iron, viz. that it possesses no power of directly stimulating the formation of new corpuscles by any influence on the cytogenic organs, but that it improves the hæmoglobin richness of already existing corpuscles, which are added to the blood by the normal processes, and consequently by improving their physiological value and vitality it indirectly increases their number. Therefore, in cases like those under consideration, where the natural power of sanguification is greatly reduced, or almost abolished, iron has little or no beneficial effect, since either very few new forms are produced, or, even if they are added to the blood, they have little or no capacity to absorb hæmoglobin and to develop into adult corpuscles.

Chlorosis is in striking contrast to the most severe forms of anæmia, both as regards its blood lesion, and its response to iron treatment. In chlorosis the supply of young, feebly-coloured corpuscles is abundant, and the number of red discs per cubic millimetre may fall in many cases but slightly below normal. The average hæmoglobin richness per corpuscle is greatly reduced, and the curative effect of iron is very rapid. A low average hæmoglobin value per corpuscle is not however peculiar to chlorosis, but is present in the large majority of anæmic cases from all causes. It indicates that feebly-coloured or young elements are being continually added to the blood, or, in other words, that the normal process of globule regeneration is active, the numerical rise preceding the rise in the physiological value of the elements. It is in these cases that iron is indicated. Arsenic was given in two cases of chlorosis, but it had no influence either in preventing relapse on the cessation of iron, or in improving the number or value of the red corpuscles (Case I. and Case IV.). On the other hand, in the most intense forms of anæmia, with great diminution in the number of the corpuscles and a high relative hæmoglobin value, iron is practically useless, or even harmful, while arsenic, as we see in the case of Caroline F., may produce a considerable rise in the number of the corpuscles, as well as great improvement in the general symptoms.

# ON "CAVERNOUS ANGIOMA OF THE TONGUE." REMOVAL BY A MODIFIED PROCEDURE. WITH REMARKS ON THE USE OF ANÆSTHETICS.[1]

BY HENRY W. FREEMAN, F.R.C.S.I. (EXAM.),

*Surgeon to the Royal United Hospital, Bath.*

MARY B—, a florid girl of twenty-seven, was admitted into the Royal United Hospital, Bath, under my care, in May, 1882, with a vascular tumour of the tongue, resembling a nævus.

*History.*—The growth was first noticed fifteen years ago, and it grew slowly for eight years. It was removed by the late Mr. Gore by "the ligature"; three months afterwards it came again, and has gradually grown for a period of four years with smart hæmorrhage at intervals, more or less bleeding occurring also every day when food was attempted. There was no malignant family history to be made out.

*On admission*, the growth was about the size of a large walnut, involving so much of the right half of the tongue as extended backwards to the circumvallate papillæ and forward to within an inch of the tip. Purple in colour, and appearing to pulsate, it could be reduced in size by pressure between the finger and thumb; it was excessively vascular, and bled profusely on the slightest touch. Mastication was impossible, swallowing difficult, and on trying to talk the girl's distress was very apparent. There were no enlarged glands about the jaw.

After consultation, we resolved to give æther, seeing the patient had "old mitral disease," and to endeavour to remove the growth without sacrificing the tip of the tongue. The wire rope *ecrasèur* was chosen for the purpose of removal.

Drawing the tongue well forward with a ligature passed through the tip, the cheek was well retracted by Hawkesley's new cheek retractor, which acted well at the same time as a gag between the teeth, a broad curved needle, looped with strong thread, was passed along the under surface of the tongue, transfixing it from below upwards and bringing out the needle just in front of the foramen cæcum behind the growth. Then seizing the thread on the surface, the needle was withdrawn and the loop of thread made fast to the wire rope and drawn through the tongue. The metal rope was then fixed to the *ecrasèur* and the right half of the organ cut through transversely. There was but little bleeding. Obviously the lingual artery had not been cut through. Then transfixing the growth with two curved needles, the wire rope was passed into the transverse section, around the needles, tightened, and slowly cutting its way through, left an inch of the tip of the tongue free. Two or three fine China twist ligatures to secure some offshoots of the sublingual artery met all the hæmorrhage that followed, and this was trivial.

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[1] Read before the Bath and Bristol branch of the Medical Association on March 8th, 1883.

The girl made a rapid recovery. Salivation was never troublesome. Iced milk by mouth only; beef enemata with egg and Benger's Liq. Pancreaticus per rectum for the first ten days. Sanitas as a wash, and dry tannin as a dressing, met all the requirements of the case.

She was discharged well at the end of a month after the operation; and when she came up to see me at the hospital a few days ago—eight months after the removal—there was no return of the growth. She articulated clearly and with ease, and masticated without the least difficulty.

*Microscopically.*—A section of the tumour was made at right-angles to the long axis of the tongue, and the muscular tissue was found to be normal in appearance. Between the superficial stratum of the superior lingualis muscle and the mucous membrane there was a large area occupied by lacunar spaces and a few blood-vessels. The spaces were bounded by connective tissue, forming numerous intersecting trabeculæ of various sizes, and there were evidences of broken up endothelia within. The mucous membrane was thin and alone formed the outer boundary of the growth. The specimen was a good example of "Cavernous Angioma," or the erectile tumour of Dupuytren, from its close resemblance to the normal structure of the corpus cavernosum penis.

I owe my best thanks to Mr. J. B. Sutton, Demonstrator of Anatomy to the Middlesex Hospital, and our late house-surgeon, Mr. G. Terry, in assisting to mount these specimens.

*Remarks.*—Mr. Morrant Baker's method of slitting the tongue through the middle from apex to base with a straight probe-pointed bistoury and cutting through half the base with the wire rope *ecrasèur* when the *whole* of one half of the organ is involved, answers excellently well, but seeing that more than an inch of the front of the tongue was here free from disease, we determined upon a modified procedure, the result being that the balance of the tongue was well maintained by preserving its tip with the attachments to the floor of the mouth, and articulation and swallowing were not materially interfered with.

The lingual artery normally runs an oblique course from its origin to its termination. It is very tortuous, and has very few anastomoses, and does not enter the inferior surface of the tongue at its extreme base; and I venture to presume that—with the cheek well retracted or, if needs be you require more room, dividing the cheek horizontally from the angle of the mouth backwards—you can, with a curved needle, transfix one half of the tongue in front of the foramen cæcum, and with the wire-rope cut through transversely without dividing the main trunk of the lingual. The dorsal branch of this artery seems to supply the root and the circumvallate papillæ. It is well to remark here, how friable the tongue-structure seems to be when cut through at a right-angle to its long axis, the rope passing through when the slightest tightening was made by the *ecrasèur* screw. It cuts through as easily as liver.

In order to secure a good operation, the wire-rope requires to be made of the softest and most pliable material. Sir James Paget has recommended the use of strong whip-cord, and it is preferable to the stiff, unmanageable rope usually supplied with the *ecrasèur.* We secured from Krohne and Seseman for this case a steel-rope, finely manufactured with material of the most malleable description. It was as pliable as whip-cord, and I have recently used it with Gooch's cannula in ligaturing an intra-uterine tumour, and found it quite as manageable.

In administering anæsthetics in excisions of the tongue it seems all-important that the anæsthesia should *not* be profound. I hold that partial insensibility is only admissible. I have seen more than one fatal case during removal of the tongue, the patient being profoundly insensible. If there be much or little bleeding, mop as much as you may, some blood trickles backwards and little pools accumulate in the glosso-epiglottidean pouches and flow over into the larynx, and the epiglottis being held erect by the drawing forward of the tongue cannot divert its course. The patient would cough up the blood if only *partially* under the anæsthetic, and this course was rigidly carried out in the present case.

# Reviews.

*Southern and Swiss Health Resorts.* By WILLIAM MARCET, M.D., F.R.S. 12mo, pp. 408. London: Churchill & Co. 1883.

*Health Resorts and their Uses.* By J. BURNEY YEO, M.D. 12mo, pp. 311. London: Chapman and Hall. 1882.

*Davos Platz, and the Effects of High Altitude on Phthisis.* By ALFRED WISE, M.D. Post 8vo, pp. 74. London: Churchill. 1881.

*Rocky Mountain Health Resorts: An Analytical Study of High Altitudes in Relation to Chronic Pulmonary Disease.* By C. DENISON, A.M., M.D. Second Edition. 12mo, sewed, pp. 192. Boston: Houghton and Co.

*Colorado for Invalids.* By S. E. SOLLY. Colorado Springs. 8vo, pp. 25.

*Phthisis and the supposed Influence of Climate: Being an Analysis of Statistics of Consumption in Melbourne, Australia.* By WILLIAM THOMSON, F.R.C.S., F.L.S. 8vo, sewed, pp. 116. Melbourne: Stillwell and Co. 1879.

*The Germ Theory of Phthisis Verified.* By WILLIAM THOMSON, F.R.C.S. 8vo, sewed, pp. 94. Melbourne: Sands and McDougall.

DR. MARCET'S work is a very convenient and handy guide to the health resorts of the Riviera, Switzerland, and Italy. It contains also notices of Madeira, Teneriffe, and Egypt. Dr. Marcet's residence for some years on the Riviera naturally renders the part of the book about it most valuable; and we regard also as most useful his account of the lower Swiss resorts, such as Montreux. Dr. Yeo's work is perhaps the most readable of all; a considerable portion of it is devoted to the Engadine, and other chapters are devoted to the Pyrenees, the watering places of Auvergne, the health resorts on the Rhine, and the winter health resorts. The latter part of the work is not so useful as the former, inasmuch as the author does not speak entirely from personal experience, but his work and that of Dr. Marcet to a great extent supplement each other.

*Davos Platz* is a short work which is neither one thing nor the other. It is neither a complete guide to Davos, nor yet is it a thorough treatise on the physiological and therapeutical effects of atmospheric influences: sunlight, wind, cold, ozone, and barometric pressure. As the author says in his preface, it consists of "notes," but notes only, which might be valuable if they were more thoroughly worked up.

Colorado is now becoming so important a health resort, that we are glad of such a guide as Dr. Denison's. He gives a climatic map of the eastern slopes of the Rocky Mountains, so that one can at a glance form a general idea of the climate. He gives a short note of the health resorts, the character of the air, an analysis of the results of treatment in a number of cases, and a discussion of the advantages of high climates in hæmorrhagic cases. He also gives hints to invalids in regard to camping out. The general conclusions he arrives at are, that the elevated health resorts of Colorado are most useful at the commencement of chronic, inflammatory, and hæmorrhagic cases, and in fibroid phthisis, in young and middle-aged subjects with little constitutional disturbance. They are unfavourable in cases of phthisis with nervous irritability and weakness, or where there is extensive deposit with commencing softening, and where the disease is already far advanced.

Mr. Solly's pamphlet is a reprint of a chapter written for Mr. A. A. Haye's work, *New Colorado and the Santa Fe Trail.* He gives very short and pithy rules for cases suited to Colorado. For example, "a broad principle is as follows: send the thin-blooded to Colorado, but keep the full-blooded away. Send those on the up grade of life and not on the down. In disease, excepting that of the lungs, where there is active change of structure, avoid the too rapid life which this climate causes."

Dr. Thomson's works on phthisis are in some respects remarkable. In the first work he analyses the statistics of consumption in Victoria, and seems to make out the powerful influence of infection in phthisis. In his second one he gives an extract from a paper he published in 1876, in which he attributed tuberculosis to microzymes, the particular form of which he supposed to be that of micrococci.

*Medical Guide to the Mineral Waters of France, and its Wintering Stations.* By A. VINTRAS, M.D. 12mo, pp. 334. London: Churchill. 1883.

*The Mineral Waters of Europe, including a Short Description of Artificial Mineral Waters.* By C. R. C. TICHBORNE, LL.D., F.C.S., &c., and PROSSER JAMES, M.D. 12mo, pp. 234. London: Ballière and Co. 1883.

*Vichy and its Therapeutical Resources.* By PROSSER JAMES, M.D., M.R.C.P. Fifth Edition. 12mo, pp. 84. London: Ballière and Co. 1883.

*Royat (les Bains) in Auvergne, its Mineral Waters and Climate.* By G. H. BRANDT, M.D. 12mo, pp. 30. London: H. K. Lewis. 1880.

*Hammam Rirha, Algiers, a Winter Health Resort and Mineral Water Cure combined.* By G. H. BRANDT, M.D. 12mo, pp. 44. London: H. K. Lewis. 1883.

*The Mineral Thermal Springs of Chatel-Guyon, Auvergne.* By G. H. BRANDT, M.D. 12mo, pp. 30. London: H. K. Lewis. 1881.

*The Mineral Waters of Aix-les-Bains and Marlioz.* By LÉON BLANC, M.D. (Paris). Fcp. 8vo, pp. 60. London: Churchill. 1883.

*Guide Médical à Contrexéville (Vosges.)* Par le Dr. DEBOUT D'ESTRÉES. Deuxième Edition. 32mo, pp. 216. Paris: Delahaye and Co. 1881. *English Edition.* Churchill: 1883.

*The Harrogate Waters.* By Dr. GEORGE OLIVER, M.D. 12mo, pp. 224. London: H. K. Lewis. 1881.

THE first work on the list is, as its name implies, a guide to the mineral waters of France. It gives in a convenient and readable form a short account of the general character and situation of the towns, the composition of the waters, the nature of the baths, the general diseases for which they are used, the excursions which can be made in the neighbourhood, the railway routes from Paris, and the amount of the railway fares. It thus forms a very handy guide indeed, and its convenience probably depends in a great measure on the fact that, although the author has availed himself of the works of many writers, he speaks in regard to most of the stations from personal knowledge.

*The Mineral Waters of Europe*, by Drs. Tichborne and Prosser James, deals specially with the chemical composition of the waters, and more especially with the mineral waters that are imported to this country. Their book is not a guide to the watering-places for persons going abroad, it is intended rather to afford information for the use at home of the mineral waters which have been imported. The small books on Vichy, by Dr. Prosser James; on Royat, Chatel-Guyon, and Hammam Rirha, by Dr. Brandt; Contrexéville, by Dr. D'Estrées; and Aix-les-Bains, by Dr. Blanc, are guides to the places of which they treat, dealing with them in much the same way as M. Vintrash has done, but much more fully and completely, as might be expected from the fact that Dr. Brandt, for example, devotes to Royat thirty pages, while M. Vintras gives it only seven. We have already had occasion to mention Hammam Rirha as almost the only watering-place to which rheumatic and gouty persons can resort in the winter,[1] and the use of Aix-les-Bains as a summer resort for rheumatism is too well known to require mention.

The guide to Contrexéville is of the form and size of Hachette's handy little guides, and it gives even more fully than the others directions for intending visitors, including not only a list of hotels, but of furnished houses. Its bulk is somewhat greater than that of the other small guides, because it contains not only general accounts but also several cases of the diseases in which the waters are useful.

Dr. Oliver's work on Harrogate is a very complete and useful one. It not only serves as a guide to Harrogate and to the use of the waters, but it discusses in a very complete way the physiological action of the various ingredients composing the waters, which are very useful in many cases of gout and rheumatism, anæmia, and scrofula.

*Clinical Lectures on the Diseases of Women.* By J. MATTHEWS DUNCAN, M.D. 2nd Edition. London : J. and A. Churchill. 1883.

THE first edition of these lectures appears to have met with a warm reception both in this country, in America, and on the Continent of Europe. The present edition is considerably larger than the first, and contains sixteen new lectures and seven so-called appendices. The appendices differ from the lectures chiefly in form. The additions in the present edition greatly enhance the value of the work, and some of them are of especial value at the present time. We would draw particular attention to the lectures on minor displacements, on the use of pessaries in minor displacements, and to the appendix on nerve lesions in gynæcology. These are calculated to give the student rational views of questions which often occupy a position quite disproportionate to their importance. Others of the lectures again treat of rare conditions, and their value is of a purely scientific rather than a practical character. The work will prove a boon to the thoughtful student of gynæcology and will advance the scientific study of the diseases of women.

*Observations on Lithotomy, Lithotrity, &c.* By REGINALD HARRISON, F.R.C.S. 8vo. Illustrated. London: Churchill. 1883.

A NEW operation is here described by Mr. Harrison, which consists essentially in perforating the enlarged prostate with a special trocar and cannula, and retaining the cannula much in the same manner as a tracheotomy tube is retained. An incision is made through the skin if desirable as a preliminary measure, beginning about three-quarters of an inch in front of the anus. The index finger of the left hand is passed up the rectum as a guide.

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[1] *Practitioner*, April 1881.

The only case in which it has yet been tried appears to have been a successful one, viz. in a patient aged 84. An indiarubber tube is affixed to the outer end of the retained cannula, and its end secured by a clip or some similar contrivance. No accumulation being permitted in the bladder, it regains its normal condition. In this instance the operation was followed by prostatic atrophy, and the urine after a few months passed once more by the urethra.

*Hospital Construction and Management.* By FREDERIC J. MOUAT, M.D., F.R.C.S., &c., and H. SAXON SNELL, F.R.I.B.A., &c. Part I. 4to. London: J. and A. Churchill and Co. 1883.

THE paucity of literature relating to hospital construction and management is so marked that we gladly welcome any work dealing with the subject. We have no hesitation in saying at the outset, as regards the volume before us, that the carefully drawn illustrations which it contains, embodying details as to the construction of many of the principal European hospitals, will of themselves go far to make its issue most useful to members both of the medical and the architectural professions. So far, only the first part of the work is published, and it is always difficult to form an estimate of the whole when only one half is before us. This first part is divided into two sections,—one from the pen of Dr. Mouat, dealing with the general principles of hospital construction in relation to the successful treatment of disease; the other prepared by Mr. Saxon Snell, and consisting in the main of a detailed and admirably illustrated description of some twenty hospitals in various parts of Europe. Dr. Mouat, in referring to hospital government, holds strongly that in the immediate management of such institutions men are required who have technical and special knowledge, and he would have the medical element to be absolute; he urges that a strict line of demarcation should be drawn between destitution and sickness, the latter only being dealt with by the hospitals, which should be subject to some central control. He treats at some length the principles of hospital construction in the future, and he is strongly opposed to the aggregation of large numbers of patients under any one roof, an arrangement which leads to the passage of ward-air laden with the exhalations of the sick from one story to another.

He presses, where this is possible, for single-story pavilions scattered over large sites in such a way as to minimise to the utmost the evils of aggregation. The principles he advocates are, we believe, right; they are being carried out in the case of some new European hospitals, and where the increased expense as to site and administration can be met the plan advocated is most desirable. The Tollet system and its means for securing the utmost amount of wholesome air are highly spoken of; and in connexion with the subject of ventilation a most useful table of coefficients of aëration prepared by Dr. Layet of Bordeaux is reproduced. The subject of lying-in wards and hospitals is discussed in some detail: these institutions have often served as a reproach to our hospital system, and it is wisely urged that small *maisons d'accouchement* and separate lying-in rooms should replace large institutions for this purpose. Dr. Mouat would still treat infectious diseases in separate wards or pavilions in connexion with our general hospitals. This plan has however been shown by others to be open to objection; and we believe the time will soon come when nearly all such cases of disease as need removal from their homes will be dealt with by the sanitary authorities. Mr. Saxon Snell's part of the work is descriptive, and it errs in being that alone, for in connexion with the descriptions it professes to indicate the deviations from a perfect standard. Both the authors join in condemning the St. Thomas's Hospital as not being worthy of imitation, but they fail to explain why, whereas it is precisely this information which is most needed. A good deal of prominence is given to some of Mr. Snell's own work, but that which relates to certain apparatus which he has patented tends to detract from the character which such a volume should aspire to. The work is however well worthy of a careful perusal, and we shall look to see some of the small defects it displays made good in the next volume.

# Clinic of the Month.

**The Connexion of Rickets and Syphilis.**—This subject is still continuing to attract considerable attention in France since M. Parrot's views were expounded, now a year or two back, in which he endeavoured to prove that rickets was only one manifestation of hereditary syphilis. It appears from a discussion on this point that very various opinions are held on the subject by the Paris surgeons. A very exhaustive paper on the same subject is communicated by Dr. Cazin of the Scrofula Hospital at Berck sur Mer, in which he completely analyses some fifty or sixty cases whose family history he has been able accurately to determine, and shows that in considerably less than 8 per cent. was there any syphilitic history obtainable. Many syphilitic parents have children quite unaffected by rickets, and *vice versâ*. Rickets often occur in the children of parents who certainly have not had syphilis. M. Cazin also states a very important point, viz., that any one like himself who is doing a country practice where he is able to follow out the life history of families, and where syphilis is a much rarer disease than it is in towns, has far better opportunities of arriving at a true conclusion on the subject than any one like M. Parrot, whose observations are limited to Paris, where both syphilis and rickets are far more plentiful. (*Bull. et Mém. de la Société de Chir. de Paris*, May 1883.)

**Papilloma of the Urinary Bladder.**—A case is described by Rauschenbusch in an inaugural dissertation at Halle, of a growth occurring in a man aged 43, which was removed by operation. The patient had been suffering from bleedings from the urethra and cystitis for about a year, and when in hospital he often passed bits of a villous tumour with his water, the dendritic character of which could easily be determined by floating them out in water. The tumour could be felt at the base of the bladder, by introducing the hand into the rectum whilst a catheter was in the bladder. Median lithotomy was performed, and the tumour, which was attached by a long stalk, was seized and twisted off, so as to avoid all danger of hæmorrhage. Three or four weeks later the patient was free from all symptoms, and the wound healed. A year later there had been no return. The author draws attention to the fact that only seven cases of such operations are recorded, and in only five cases were they attended by success. It appears too that the favourite seat of these tumours is on the trigone, and near the orifices of the ureters, very rarely if ever at the top or sides of the bladder. (*Centralblatt für Chirurgie*, No. 1, 1883.)

**Lacrymal Fistula of Dental Origin.**—M. Parniaud showed a case of abscess which was lacrymal in situation, at the Paris Société de Chirurgie. In the report upon the case, attention is drawn to the fact that abscesses in this situation may be due to osseous lesions from syphilis or scrofula, but are very rarely associated with the teeth. All the first set of teeth had been shed except the canine on the right side; just by the side of this was a fistulous track which had however no communication with the lacrymal abscess so far as could be determined. The canine, however, was extracted, and was found to exhibit symptoms of caries both in the crown and also at the root. There had been for two months previously a swelling of that side of the face and mouth of a chronic character, which quite disappeared on the formation of the abscess. The abscess refilled several times, but eventually disappeared, and seemed much benefited by the extraction of the tooth. It appeared therefore that there was a real connexion between them. How that connexion was set up seems difficult to understand exactly, except that it must have been through the superior maxillary bone. It was probably due to the setting up of alveolar periostitis in the tooth socket, and thence, by the lymphatics presumably, the inflammation was carried to the lacrymal situation. (*Bull. de la Soc. de Chirurgie*, April 1883.)

**Puerperal Fever.**—At a recent meeting of the Irish Academy of Medicine, Obstetrical Section, Dr. Athill detailed the results of his observation of puerperal fever, which he prefers to name *metria*. Like many other observers, he does not consider this disease to be specific in the sense that scarlatina is so. He describes the following varieties: (1) Septicæmic, due to the actual conveyance of putrid material on the hands of attendants, on instruments, &c., and not infectious through air alone. (2) Sapræmic, so named for the sake of distinction from the septicæmic variety, with which it is identical in all points but its mode of origin, putrefaction being excited spontaneously in this variety in clots or pieces of placenta retained in utero. This form, as also observed by Dr. Alexander of Liverpool (*Med. Times and Gaz.*, May 1883), is apt to arise in patients distressed in mind, from defective post-partum contraction of the uterus and consequent retention of clots. It is ushered in by fretfulness and rapid pulse, and develops its type in about twenty-four hours. (3) Infectious and epidemic; this does not arise from mere overcrowding, nor is it truly septic, but it arises in connexion with zymotic diseases, and is itself a zymotic fever in a puerperal woman; erysipelas will cause it, and conversely has been known to result from it. Such an epidemic at the Rotunda Hospital was traced to a case of typhus which entered the ward first infected. Under the circumstances of parturition, this zymotic variety is disguised in characters, but still distinguishable by its evident etiology, and its peculiar infectiousness. It differs from the septicæmic kind in being more severely painful and much more rapid in its course. It is to be stamped out by the same disinfectant measures as are effectual in arresting the spread of zymotics. (*Lancet,* June 16, 1883.)

**Pulmonary Complications of Erythema Nodosum.**—Professor Germain Sée, in a clinical lecture on erythema nodosum and the pleuro-pulmonary affections which sometimes accompany it, comes to the following conclusions: (1) that erythema nodosum is a specific fever analogous to the exanthemata, and not a cutaneous manifestation of rheumatism; (2) that the affection, which is usually benign, may, like the exanthemata, be complicated with accidental disorders of the respiratory organs; (3) that pleurisy is the commonest complication, not infrequently accompanied with bronchopneumonia; (4) that this pleurisy seems in general to present no peculiar characters; (5) that in a fatal case the characters were the development of the pleurisy in isolated and distinct patches, the unusual thickness and abundance of the fibrinous exudation, and the small amount of fluid effused; (6) that the prognosis of the pulmonary disorder, like that of the primary affection, is favourable, though two cases occurred in which they led to a fatal result; (7) that the pleuro-pulmonary complications are not rheumatismal in origin any more than the primary erythema; but that they are directly referable to the specific principle or virus of the disease. (*Progrès Médical.* April 14 and 21, 1883.)

**Complete Suppression of Saliva after Mumps.**—Mr. St. Clair Buxton relates the following interesting case: A lady of over middle age, while in the country, contracted mumps. As soon as the acute inflammation of the salivary glands had subsided, and all pain and swelling had disappeared, she returned to town, and I was called in to see her. She spoke with great difficulty, and was forced to sip water at very short intervals in order to be able to speak at all. She told me that ever since the pain in the parotids and submaxillaries had vanished, her mouth had remained persistently quite dry. On examination I found her tongue, gums, cheeks, palate, and pharynx—in fact, as much as it was possible to see of the mouth and throat—in a fearfully dried-up state. The tongue was thickly coated with a tough brown fur, which was horn-like. So hard was it, that on striking it gently with a metal probe a distinct sound as of tapping the cover of a book with a cedar pencil was produced. The rest of the interior of the mouth was also extremely hard, and she experienced great stiffness in opening and closing the jaws. No swelling or tenderness on pressure existed about the salivary glands, and the orifices of Stenson's and Wharton's ducts were plainly seen. It is needless to say that she retained no sense of taste. She complained of the heat felt in the mouth, but the temperature was quite normal. Her sleep was greatly disturbed at night, and she awoke at short intervals with the most intense longing for cold water; but drinking afforded no relief. It is worthy of notice that for some three or four years she has been affected with paralysis agitans, both limbs of the right side being very shaky. She enjoys otherwise excellent general health, and, notwithstanding the trembling in the right leg, is able to walk well, and takes plenty of exercise out of doors. There was a great deal of difficulty in feeding her, for she absolutely refused milk and beef-tea, and the effort necessary to swallow jelly and other semi-solid food was very great. I prescribed gargles of potassic chlorate, and ordered glycerine to be applied locally to the interior of the mouth and surface of the tongue. I ordered also an infusion of fifty grains of jaborandi to be taken daily for four days. Although the glycerine afforded some slight relief to the mouth by its mechanical effect as a lubricator, there was positively no effect produced on the salivary glands. Copious perspiration (from the jaborandi) took place, and left her feeling very weak. I therefore abandoned that drug, and substituted mercuric iodide dissolved in excess of potassic iodide. I gave large doses for ten days with no result beyond the production of a feeling of malaise. It was evident that something must be done soon to excite the flow of saliva, for the patient had been in this condition for nearly three weeks, and was in the lowest depths of despair and misery. The next step which I took, therefore, was the application of a continuous current of electricity generated by a 30-cell battery (pint cells) of the Leclanché type. I introduced a very fine silver probe into Stenson's duct on one side, and pushed it gently on until I met with obstinate resistance to further entrance. The probe had then entered the duct about an inch. My assistant held the positive electrode firmly to the nape of the neck, while I cautiously applied the negative pole to the free end of the probe. I instantly noticed a contraction of the fibres of the buccinator, but as no pain resulted I fixed the wire to the probe and allowed the passage of the current to continue for ten minutes. While the probe was in the duct, a thick white liquid oozed from the orifice. It looked something like pus. On removal of the probe a single drop of clear saliva followed it. Thinking that it was just within the bounds of possibility that a small abscess had existed somewhere about the duct and had been overlooked, and the probe had simply opened it and so cleared the obstruction to the flow of saliva into the mouth, I determined to thoroughly explore the other Stenson's duct and both Wharton's ducts before applying the current again. I passed the probe into all three remaining ducts as far as possible, removed it, compressed and squeezed the parts, but no pus followed. I repeated this again, but without finding a trace of pus. I then applied the current as before, with precisely the same result as in the first instance. I had the satisfaction of seeing four drops of saliva, one at the orifice of each duct. I visited my patient an hour afterwards, and a gentle flow of saliva was discernible from each duct. For three days the quantity steadily increased, without any further use of the current, and, at the end of that time, almost the normal amount was being poured out. The mucous membrane lining the mouth and the tongue was rapidly resuming its natural appearance. I have not seen my patient since, but I received a letter two days later stating that she had greatly improved; that the tongue was feeling quite comfortable, and that she was able to taste. A somewhat similar case is mentioned in the *London Medical Record*, 1877. The suppression of saliva resulted on that occasion from tonsillitis, and the flow was restored by stimulation by continuous current "frequently reversed." I did not reverse my current, preferring to submit the glands to the continued action of the negative pole. I find no mention of the condition in any medical work in which I have searched, including Quain's *Dictionary of Medicine*. (*Lancet*, June 23, 1883.)

**The Treatment of Hordeolum.**—Mr. FitzPatrick gives his recent experiences in the treatment of hordeolum, or the common stye, during the time he was in Egypt. The plan of treatment adopted is to dispense with hot fomentations, &c., and to apply locally tincture of iodine to the lids, care being taken to keep them apart until dry. A few applications in the twenty-four hours is often sufficient to arrest the development of the stye. (*Lancet*, April 21, 1883.)

**The Placental Origin of Congenital Heart-disease.**—Dr. Von Hoffmann records (*Trans. of German Med. Congress*,

1882) a case of congenital closure of the semilunar valve. The child suffered at birth from cyanosis, atelectasis, and great irregularity of the heart's action, and died from suffocation on the third day. The placenta had been previously examined, and had been found to be the seat of numerous recent and old extravasations. From these hæmorrhagic foci, pathological products had been introduced through villous absorption into the fœtal circulation, and had thus given rise to endocarditis. The placental extravasations had been caused by violent fits of coughing, from which the mother had suffered about the sixth month of pregnancy, which date also corresponded to the beginning of the fœtal endocarditis. Von Hoffmann advises careful examination of the placenta in every case of childbirth, and believes that much light might thereby be thrown upon the etiology of diseases of the new-born. (*London Medical Record*, June, 1883.)

**Obstruction of the Bile-duct by a Round-worm.** —The following case is reported by Dr. Mallins, of Watton: M——, an officer in the Indian army, who had served during the Afghan campaign of 1878-79, proceeded, on the renewal of the war on Sept. 13, 1879, to Dhaka, a fort situated at the Afghan end of the Khyber Pass. While stationed there he enjoyed good health until Oct. 13, when he was attacked with intermittent fever of a very mild type. The attack, however, an unusual event in his case, was attended with a good deal of nausea and vomiting. Two days subsequently a decidedly yellow tinge of the conjunctivæ was noticed, and a week later well-marked jaundice was developed, with its usual accompaniments of whitish stools, dark-brown urine, &c. The appetite was not much impaired, but the ingestion of nearly every kind of food procurable was attended with so much subsequent nausea that the amount of nourishment taken was extremely small. Three weeks after the full development of jaundice, yellow vision and intense irritation of the skin, particularly that of the lower extremities, were complained of. No enlargement of the liver could be made out; very slight tenderness on pressure over the region of the gall-bladder was the only local indication. On Dec. 4 the emaciation, due no doubt to the want of sufficient nourishment, had become so marked that, acting on the counsel of his medical advisers, he returned to India to try the effect of a change to a hill climate. After a month's residence at one of the hill stations, there being no amelioration whatever in his condition, he applied for and obtained furlough to Europe. Several days' delay occurred at Bombay prior to his embarkation. The second day after his arrival at that city, Jan. 18, he had occasion to go to the closet, and while inspecting the excreta, as had been his wont since the commencement of the attack, discovered, to his great surprise, a large ascaris lumbricoides, apparently dead, one end of its body, to the extent of half an inch, being of a deep green colour. The very next day the stools began to exhibit a slight amount of the normal bilious hue. Ten days after embarkation their colour was quite natural, and before landing in England convalescence was satisfactorily established.

*Remarks.*—The subject of this record had undergone all the privations of the campaign of the previous year, including those of the terrible march back in June, historically known as "the march of death." It is more than probable that in quenching his thirst with some roadside water of doubtful quality he swallowed the ovum of the parasite with which he subsequently became infested. The immediate reappearance of bile in the stools which followed its expulsion, and the deep staining of one end of the parasite, render it very probable that in its migrations it entered the ductus communis, thus effectually plugging it and preventing the flow of bile. The mechanical nature of the obstruction readily explains the failure of every remedy that was tried. The practical point deducible from the foregoing case would seem to be, that when a case of persistent jaundice —this case lasted exactly three months—is met with, in which no organic disease of the liver can be made out, and where there is no constitutional dyscrasia which would account for the symptom, the possibility of the plugging of the common bile-duct by a round-worm should not be overlooked. There can be but little doubt that a few doses of santonin would have materially abridged the duration of the case above recorded. (*Lancet*, June 30, 1883.)

**Rupture of the Sciatic Nerve.**—Dr. Conrad Küster reports a case in which a rupture of the sciatic nerve was mistaken for fracture of the neck of the femur. The patient, a strong man, aged 30, slipped and fell backward while walking. He immediately felt a severe pain in the right leg, and numbness in the foot. He was unable to stand, and was carried to his house, where Küster saw him on the following day. At that time, he was suffering great pain in the limb—so great that a dose of morphia only partially relieved it. The limb was rotated outward, and seemed shortened. There was slight swelling in the neighbourhood of the hip-joint, and pain on pressure was most severe at this point. At first sight, there seemed to be a fracture of the neck of the femur. This diagnosis had been guardedly made by two physicians, who saw the case soon after the accident, but, on account of the intense pain, had not made an examination. Dr. Küster diagnosed rupture of the sciatic nerve, as there was no crepitation, and passive movements caused but little pain. The subsequent conduct of the case confirmed this diagnosis. Morphia was given to relieve the pain, and warm baths administered as soon as possible. The patient was in bed over six weeks, and five months afterwards was able to go about with a crutch and stick. (*Berlin. klin. Woch.*, March 26, 1883.)

**Hæmatoma of the Pancreas.**—At the meeting of the German Medical Society in Prague, on March 9, Professor Gussenbauer showed a patient in whom he had punctured a blood-tumour of the pancreas (*Wiener medicinische Wochen.* No. 13). The man was forty years of age, and had in the previous year become the subject of an acute "gastricismus," said to be caused by a monster meal, of which sausages, beer, and spirits formed the staple portion. Since that time he had been the victim of gastric and intestinal disorder, and his complexion had changed to a yellowish-grey tint. When first examined by Gussenbauer, a fluctuating swelling was detected between the navel and the xiphoid cartilage, apparently retro-peritoneal, and of about the size of two fists. The diagnosis rested, therefore, between soft sarcoma, abscess, and cyst, including hæmatoma. The duration of the affection (about three months), was held to be against the possibility of sarcoma. The absence of pain and the fixation of the tumour were regarded as opposed to the diagnosis of abscess. The diagnosis therefore lay, according to Gussenbauer, between cyst and hæmatoma either of the pancreas or supra-renals. Why the idea of hæmatoma should have suggested itself to Gussenbauer does not appear. It is curious that he should have mentioned it in arriving at a diagnosis by the process of exclusion. The probability is that his knowledge of the subsequent course of the case coloured these preliminary remarks on differential diagnosis. A median incision was made through the abdominal wall directly over the tumour. The parietal lamina of the peritoneum was in process of being stitched to the anterior wall of the tumour, when an accidental puncture of the swelling permitted the escape of a dark-coloured fluid. By means of a trocar 1900 cubic centimetres of the fluid contents were drawn off. The wall of the cyst was in many places smooth; in others, especially beneath the transverse colon, rough and irregular. After the cavity of the cyst had been washed out, antiseptic dressings were applied. For the first days a sanguinolent fluid with some black lumps escaped. The fluid discharged was proved to contain blood. No fever followed the operation. After a few days an eczematous condition was observed about the wound, such as is met with in cases of gastric fistula. Some of the discharge was collected, and found by experiment to digest albumen (forming tyrosin and leucin), and to transform starch into sugar. Professor Gussenbauer said that the fistula had twice spontaneously ceased to discharge, but the appearance of fever necessitated the restoration of the fistula, after which the fever subsided. Examination still revealed, at the time the patient was shown, the presence of a cavity about an inch long and rather more than an inch wide, from which the pancreatic secretion yet flowed. The conclusion at which Gussenbauer arrived was that a cyst had formed in the pancreas as the result of obstruction in the duct. This was most probably produced by the presence of a stone, the existence of which might also explain the occurrence of hæmorrhage into the cyst. No mention is made of the actual detection of a calculus. The stools were not characterised by the presence of fat, and the patient presented no signs of disease beyond what have been mentioned. Professor Chiari, in the course of some remarks on the origin of cysts in the pancreas, mentioned a case in which, as a result of "peri-pancreatitis," the whole of the pancreas had necrosed, and had been passed *per anum.* There was no doubt about the sequestrum being pancreas. The man recovered, and the case was published in the *Wiener med. Wochen.* for February, 1880 (see *Medical Times and Gazette*, vol. i. 1880, page 270). In the Pathological Museum at Vienna, Rokitansky has a similar preparation of a necrosed pancreas. (*Med. Times and Gaz.*, June 30, 1883.)

**Succus Conii in Chorea.**—Drs. Clifford Allbutt, Eddison, and Churton have obtained good results in the treatment of chorea, with violent movements, by large doses of succus conii. The patients took from ʒij every hour to ℥ss every four hours during two or three days. It was given sometimes alone, sometimes in combination with morphia or bromide of potassium. It seems that the best results are obtained by large doses at first, until the system is thoroughly under its influence, when smaller doses, frequently repeated, will keep up its action. No toxic effects were ever noticed in these cases. The cases seem to show: (1) That the drug, to be of any service, must be given in large doses; (2) that its action must be sustained by frequent repetitions of the dose at short intervals. The uncertainty of the action of given specimens of succus conii necessitates great care in its administration, and tells against its general adoption. But cases in which neither chloral nor morphia have any effect may arise, and in which, as in the above, succus conii may prove efficacious. (*Lancet*, May 26, 1883.)

**Tuberculosis simulating Leukæmia.**—M. Albert Robin communicated to the Société médicale des Hôpitaux of Paris, notes of the case of a man of 24, presenting all the symptoms of leukæmia as regards the liver, spleen, glands, blood, and urine; he suffered from dyspnœa, attacks of suffocation, and a hacking cough, the lymphatic glands were everywhere enlarged, and the skin showed signs of purpura. Post mortem the spleen was found to be enormously enlarged, and riddled with tuberculous cavities and tubercles in all stages of growth; the liver weighed about six and a half pounds, and was in an advanced state of granular and fatty degeneration. In brief, the case was apparent as one of general tuberculosis affecting the spleen, lymphatic glands, kidneys, and in part the lungs. It thus appears that there is a form of tuberculosis attacking the lymphoid organs which presents all the signs of true leukæmia. (*Gaz. des Hôpitaux*, June 26, 1883.)

**Milk and Eggs in Insanity.**—Dr. Clouston, in the Annual Report of the Edinburgh Royal Asylum for 1882, draws attention to the good effects produced by the liberal use of milk and eggs in the case of nervous patients. He gives to such patients as many as a dozen eggs, and as much as six or seven pints of milk a day. When this form of treatment is associated with plenty of walking exercise in the open air, a great increase of weight often takes place. "A gain, he says, "of two or three stone is quite common, and usually there is an immense advance along with this in nervous stability, in contentment and in self-control, even if a complete recovery does not take place."

**Subcutaneous Injections of Arsenic.**—Köbner, who had previously published an account of successful treatment of lichen ruber by subcutaneous injections of arsenic, has recently been able to cure by a similar method a patient who was the subject of generalised sarcoma of the skin. When arsenic is used in this manner, Köbner recommends that the Fowler's solution should be freshly prepared. For injection he dilutes it with twice its volume of distilled water. The patient in question was a girl, aged eight years, and the doses which led to absorption of the tumours were at first two and a half to four drops daily, raised after three months to seven and finally to nine drops daily, proportionately diluted. (*Berlin klin. Wochenschrift*, No. 2, 1883.)

## Extracts from British and Foreign Journals.

**Fracture of the Clavicle in its Outer Third.**—A lecture on this subject was delivered by Professor Lewis A. Sayre, at Bellevue Medical College, and reported in the *Med. and Surg. Rep.*, of Philadelphia. He said:—

Gentlemen,—I here present to you a case which is of considerable interest, although it hardly comes under the Chair of Orthopædic Surgery, unless considered as a prevention of deformity.

This young man informs me that a few days ago he fell from a waggon, striking upon his shoulder, which has resulted in a fracture at the outer third of the clavicle. You note how my finger drops into the depression at this point, and how extensive the discoloration of the tissues. Now, in these cases the shoulder drops downward, forward, and inward, the pectoralis major drawing it downward and forward, while the sterno-mastoid, drawing the sternal end of the clavicle upwards, results in the deformity you see here. I suppose there have been more instruments devised for treating fracture of this little bone than all the instruments for other fractures put together. I cannot take time to enumerate them, but two or three years ago Dr. Frank Hamilton occupied three consecutive lectures in applying these various methods (before the class) upon patients admitted into the hospital for fracture of the clavicle, and then concluded his exhibition by informing the class that all these methods were of no avail, and he would not advise their use, but stated that the patient should be placed in bed, with a pillow between the shoulders so as to bring them well back, the patient to remain perfectly quiet; this treatment he considered all that was necessary, and termed it postural treatment.

If a man can lie absolutely still for six weeks, union might be effected in this manner; but the deltoid muscles and the muscles of the shoulders would probably move and prevent union of the bone.

My plan of treatment is simply this: I take two strips of adhesive plaster 2½ inches wide, then, passing one strip of adhesive plaster around the arm at the junction of the lower and middle third, I make a loop, leaving an open space at the posterior part of the arm, as you see: this prevents strangulation. Then drawing the arm back, I bring the pectoralis major upon the stretch, but the acromial end of the clavicle still rides under the sternal fragment; I now secure the arm back by passing the strip of adhesive plaster around the body, bringing it under the arm of the opposite side, across the thorax, and fasten it to itself on the back. (See Fig. 1.)

Care must be taken not to draw the arm too far back, but just sufficient to put the pectoralis major upon the stretch. I now take this other strip of adhesive plaster, and make a slight longitudinal cut in the centre to admit the point of the elbow; you now flex the arm at an acute angle over the chest, drawing it upward, forward, and inward, and in this manner you reduce your fracture, as you see that I have done in this case. (See Fig. 2.) Bringing both fragments of the bone into a perfect line; you now secure the arm in this position by passing the strip of adhesive plaster over the elbow across the back diagonally to the opposite shoulder, then bring the anterior end of the strip up along the hand and arm over the chest, and fasten it to itself at the shoulder. (See Fig. 3.)

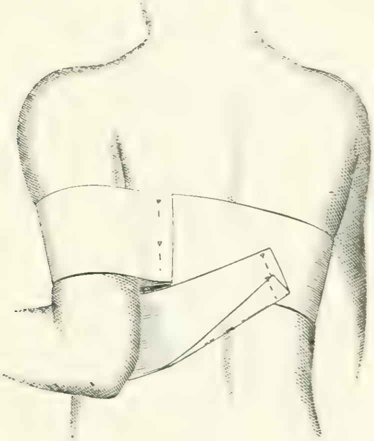

FIG. 1.

I desire you to note this carefully, as it is the most simple method of treating the fracture of the clavicle that I have ever seen, and is the only plan of treatment which will yield a perfect result without deformity.

One advantage of this plan of treatment is this; it is absolutely impossible to dress a fracture of the clavicle in a child with any complex bandage satisfactorily, whereas in this your bandage is perfectly secure, and there is no possibility of its becoming displaced. Never use an axillary pad, as the pressure by this means often stops the circulation of the arm, and the pain following this occurrence is something terrible.

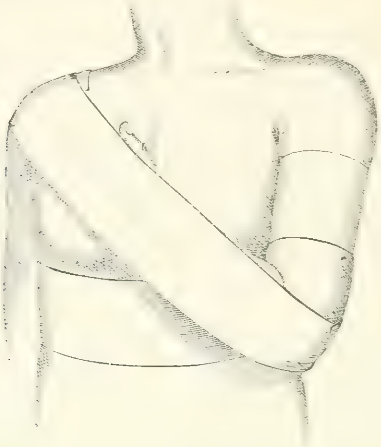

Fig. 2.

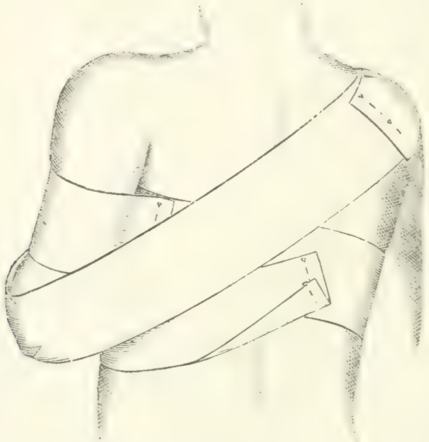

Fig. 3.

It is impossible now to displace those fragments as I have dressed this man's injury, and he can go to work with his other hand. If you were to dress that fracture in such a manner as to render that man unable to use his other hand to earn his living, you ought to be compelled to pay for the loss of time which would follow such treatment. I have treated numbers of fractures in this manner with the most perfect results, and I defy any one to detect the point of fracture when cured; I say that a fractured clavicle can be cured without deformity. Excuse me for my warmth upon this subject, but I have been censured so recently by our own surgeons upon this point that I feel compelled to reiterate my statement somewhat forcibly, and will demonstrate the fact before you in the case now before us, as I intend that you shall see this man when he is cured.

[The following week the man appeared before the class; the bandage was found to be in the same condition as when applied, the fracture was immovable, and the line of the clavicle perfect; two weeks later the bandage was removed, perfect union having been secured; nor was there any deformity perceptible, the fragments having united in a perfect line.] (*Lond. Med. Record*, July, 1883.)

**New Theory of Albuminuria.**—At a recent meeting of the Paris Academy of Medicine, M. Semmola of Naples brought forward a new theory with regard to the causation of Bright's disease. This malady he regards as not essentially renal, but as consisting in a general morbid alteration of nutrition, and observes that albumen in such cases is not passed by the urine only, but by all the secretory organs. This alteration deprives the albuminoid materials of the blood of their power of being assimilated, and so causes their excretion by the emunctories. The renal lesions he ascribes to mechanical irritation of the tubules of the kidney by the constant passage of albumen through them. Albuminuria is therefore a cause, not a result, of renal disease. M. Semmola founds these views on a series of experiments on animals. He injected into the blood-vessels various substances containing albumen, as white of egg, milk, and blood serum, with the result of inducing artificial Bright's disease. White of egg was most active in this way. He therefore concluded that the more nearly albuminoids approach the characters of serum-albumen, the less likely they are to injure the kidneys by irritation, and *vice versâ*. (*Progrès Médical*, June 9, 1883.)

**Blood Pressure in Aortic Insufficiency.**—At a meeting of the Société de Biologie, M. Franck made the following statement in regard to the blood pressure in aortic insufficiency, which he had produced artificially. He found that the blood-pressure, instead of being diminished rapidly, adjusted itself to the altered condition at the heart by rising to the normal degree, or even higher. He explains this on the grounds (1) that the action of the left ventricle is increased under these conditions (as proved by the experiment of fixing a manometer in one of the aortæ of a frog), and (2) that as a result of the impact of the stronger blood-wave thus produced on the small peripheral vessels there is reflex contraction of these which soon becomes a chronic condition. The researches of MM. Dastre and Morat afford examples of such diminution of arterial calibre. The pallor of aortic regurgitation, and the vertigo, and some other symptoms which accompany it, are thus explained. (*Progrès Médical,* June 9, 1883.)

**Blood Changes in Erysipelas.**—Dr. Norton Whitney gives an account of the observations made by other authors on this subject, and then states the result of his own. In specimens of blood from cases of erysipelas which he examined, fine granules were seen, both free and in masses, but these were only in a few cases in excess of those seen in the normal blood. The rapid formation of a network of fibrin under the cover-glass was a noticeable feature in nearly all specimens of erysipelatous blood. The bands of fibrin appeared generally to start from granules or granular masses. When tincture of perchloride of iron, in the proportion of one drop of the tincture to an ounce of a solution of common salt, sp. gr. 1·070, was added to specimens of blood of double the bulk, it materially affected the behaviour of the red blood corpuscles. In the case of healthy blood these became somewhat hardened and contracted, rebounding as if hard and elastic when impinging upon one another, and failing to form into rouleaux. In blood from a patient suffering from erysipelas, these corpuscles seemed to lose the sticky appearance which they present in this disease. This effect of the ferric chloride was more marked with the weaker than the stronger solutions, and possibly may have been due to the astringent properties of the tincture. It seems probable that the red corpuscles of the blood have their function as oxygen carriers modified by the poison of erysipelas, whatever that may be. In support of this may be mentioned the appearance of the corpuscles themselves under the microscope when first withdrawn from the circulation,—their elasticity being apparently in a great measure lost, and their softness being so great as to permit of their being drawn out into a spindle-shaped form or into filaments by the application of the slightest force. Sometimes they appear to have almost lost their definition, and look like streams of yellow fluid crossing the field of the microscope.

They become rapidly decolorised and crenated, and give up with apparent readiness some of their component parts so as to form blood crystals with great ease. The vitality of the blood itself appears to be lowered as indicated by the rapid formation of active bacteria in it after its withdrawal from the body. The known value of iron in the treatment of erysipelas, together with its acknowledged action either upon the corpuscles themselves, or upon their production, may also be looked upon as affording additional proof, whilst the appearance of erysipelas of the face on the right side in thirteen out of fifteen cases of that form of the disease observed (a fact most probably to be accounted for by the differing blood-supply of the two sides), and a tendency to periodic occurrence noticed in these and other cases, go to support the position by pointing to the blood in general as affected. The part which micrococci or other foreign organisms play in these changes has as yet perhaps to be determined. Zweifel, however, has recently advanced the hypothesis, based upon various experiments, that, as normal blood by being deprived of its oxygen without being exposed to the influence of atmospheric germs can become poisonous, and acquires septic properties (certain specimens of non-deoxygenated blood containing micrococci having been proved harmless), therefore no pathogenetic property is inherent in the organisms found in these experiments, unless these micrococci can form a poison in the blood as soon as there is no more oxygen to be consumed. Assuming this to be true, it will be seen that any interference with the functions of the oxygen-carriers of the blood would at once bring about the necessary condition for further pathological changes through the medium of these organisms. The production of acid by bacteria would tend to destroy the hæmoglobin, and the softening of the red corpuscles would increase their tendency to wander out. The micrococci can only be hurtful when the blood has lost some of its normal vital resistance, and if we assume that the alterations of the red blood corpuscles are a principal factor in the alteration of the blood, we shall expect to find such remedies as iron useful, and this is shown by experience to be the case. (*Philadelphia Medical Times*, March 10, 1883.)

**The Sense of Dizziness in Deaf-mutes.**—Dr. James of Harvard has begun an inquiry with a view to discover how far the directing power attributed to the semicircular canals is defective in persons whose organs are presumably damaged: namely, the inmates of deaf-mute institutions. His theory is that, seeing the consciousness of movement of the head through space when exaggerated causes vertigo, as in whirling round rapidly, rising from the stooping posture suddenly, &c., "disease of the internal ear is likely to confer immunity from dizziness." He does not give any classification of the persons experimented on as to the lesions causing the deafness, which indeed it is not perhaps possible to do very precisely, according to our present powers of diagnosis, and he has classed congenital deaf-mutes with those in which the deafness came on at various ages through disease, not having apparently found any difference in the results in the two classes. He has however eliminated, so far as possible, all causes of vertigo except that arising from the "directing sense." He has kept the patients' eyes closed so that they should not be confused by visual images on the retina in whirling round, and in almost all the experiments has used passive rotation so as to get rid of any muscular unsteadiness. His results are certainly very remarkable. He first tested 200 students and tutors in the Harvard College, and found only one among them free from dizziness on rotation, whereas of the deaf-mute cases, 519 in number, 186 remained perfectly free from the feeling, and 134 others are stated to have been only slightly affected. Passive rotation was effected by placing the patient in a swing of which the two ropes were tightly twisted, and then allowed to untwist. The swing was stopped when it had nearly come to rest, and the patient directed to walk to a fixed point, the dizziness being judged of by the irregularity of his gait.

Further inquiry was made among the "non-dizzy cases" as to whether the feeling was experienced in sudden rising from the stooping posture, or other movements than whirling. The replies varied and so were unsatisfactory.

Again, assuming that sea-sickness arises through over-excitement of the directing sense, as maintained by Helmholtz in his *Optics*, written before this special function of the semicircular canals was discovered, inquiry was made as to whether any of the deaf-mutes had suffered in rough weather at sea. Of fifteen cases who had been at sea not one had been affected. This result, though only negative evidence, is confirmatory of the theory, and he bases thereon a noteworthy suggestion of counter-irritation of the semicircular canals by blisters behind the ears as a remedy in that distressing ailment.

The noteworthy remark is made that the ataxia of the deaf is chiefly found in those who have become deaf from meningeal or other disease, and is rare in congenital cases. This is accounted for by supposing that in the latter cases the central directing power has never formed any connection with the canals, whereas in the former such connection formed in early life, and lost through disease, left the central organ at fault. Again, it is suggested that as the ataxia tends to improve with time, no doubt from the formation in most instances of new peripheral connections, it may in some cases, as after diphtheria, be due to a temporary anæsthesia of the canal.

The investigation, though unfinished and in many respects inconclusive, is very suggestive and interesting, as it brings clinical facts in relation with recent physiological discoveries. (*Otological Journal*, Oct. 1882.)

**Epidemic Pneumonia.**—An interesting epidemic of croupous pneumonia, which seems to point to its infective character, is the subject of a paper by Dr. Heinrich Schmidt, of Königsbrunn, in the *Berliner klinische Wochenschrift*, No. 23. The outbreak occurred at Zang, a village of 549 inhabitants, situated on the Aalbuch, and surrounded by woods. The inhabitants are hard-working, and their food is coarse and frequently scanty. The water-supply is bad. Typhoid fever occurs only sporadically, and ague is unknown. An epidemic of measles occurred amongst the children in the month of March, 1882. Ordinary croupous pneumonia occurs pretty frequently. A case of pneumonia occurred on April 5, which however does not belong to the epidemic under notice. The first case of the epidemic occurred on May 11, and between that date and June 18 seventeen cases occurred. On July 10 a case of pneumonia also occurred, but this was not part of the epidemic. Two of the cases ended fatally, and four ran an abortive course. The cases all occurred in neighbouring houses. Six cases occurred in a very poor family, whose hygienic surroundings were very bad. The period of incubation seems to have been in most cases about five to eight days. The weather in May was cold, but warm in June. Most of the epidemics of pneumonia have been described as occurring in closed places, usually institutions or prisons. Kerchensteiner observed an outbreak of pneumonia which spread like an epidemic, and was of a typhoidal character. The overcrowding of the sleeping apartments he considered as a most favouring circumstance. Inoculation of animals with the blood of these pneumonic patients gave no result. Penkert, in the *Berliner Wochenschrift*, Nos. 40 and 41, 1881, described an epidemic occurring in a small place of about 700 inhabitants. He considered that the infective material had been carried from a neighbouring churchyard by the wind to a school where the first twelve cases occurred, and that the disease afterwards spread from person to person. The epidemic was of a mild character, differing from most epidemics described. The *Deutsche Vierteljahrsschrift für öffentliche Gesundheitspflege*, 1882, Bd. ii., pages 366 and 367, mentions an epidemic comprising seven cases occurring in Uster, three of which ended fatally. The cases were described as typhoidal pneumonia. In Börner's *Jahrbuch der practischen Medicin*, 1882, page 239, an epidemic is mentioned by Schwede and Münnick. It attacked fifteen children out of fifty, and occurred within thirteen days in a small village, whilst in the neighbourhood no case occurred. Epidemics of pneumonia have been noticed in garrisons—in the 1st Army Corps at Königsberg, Dantzic, and Grandenz, commencing in January, 1875, and ending in July, 1875. Another epidemic occurred in the 4th Army Corps in the winter of 1875 and 1876. The symptoms in both epidemics were almost the same—prodromata, with various general symptoms, high fever, and at the commencement no distinct local signs in the lungs; next, severe head-symptoms, and profound prostration of strength; then local mischief in the lungs, and with it increased rise of temperature; no true crisis, or only after the seventh day, then diarrhœa. Very frequently there was considerable swelling of the spleen and liver, with slight jaundice, and marked and rapidly occurring heart-failure. [Compare *Practitioner*, xxxi. 31.] (*Med. Times and Gaz.*, June 23, 1883.)

**Congenital Diverticulum of the Left Ventricle.**—A rare and curious example of cardiac abnormality has been recorded by Dr. Gibert of Havre (*Progrès Médical*, June 9), as occurring in an infant who lived to the age of ten months. The child was born with a ventral hernia, the abdominal wall being defective in the middle line from the umbilicus upwards. A large pulsating vessel was noticed to be present together with the hernia, and as time went on this vessel increased in size till at the time of death it was as large as the finger. On examination it was found that the diaphragm was also defective, so that the pericardium opened into the peritoneal cavity, and projecting into the abdomen was a pouch-like diverticulum, connected with the apex of the left ventricle, with muscular walls, and internally marked by fleshy columns like the ventricular cavity itself. This diverticulum was thirty-eight millimetres in length, and shaped like the finger of a glove. Dr. Gibert suggested that the non-closure of the ventral wall was probably due to the presence of this cardiac deformity; but the converse hypothesis, that the pouching of the ventricle depended on the defect of the diaphragm and abdominal wall, seems to be held by Dr. R. Blanchard, who made a further dissection of the specimen, for he speaks of it as being the congenital formation of a kind of true infundibular form of aneurism of the apex of the left ventricle—"a fact the more curious, because at that period of life the left ventricle only plays a very subordinate part, and this protrusion of a portion of its wall cannot therefore be attributed to an excess of internal pressure." However, we are not aware that in any recorded case of pericardial deficiency a similar ventricular aneurism has been observed.

Dr. Peacock, who refers to several cases of defect of the pericardium, including the classical one referred to by Baillie, makes no mention of such an abnormality in his work on malformations of the heart. In cases of ectopia cordis the organ is generally misplaced in whole or in part; one case mentioned by Dr. Peacock as having been published by Dr. O'Bryan most resembles Dr. Gibert's, for in it a portion of the left ventricle protruded through a triangular aperture at the anterior and upper part of the abdomen, produced by the absence of the xiphoid cartilage and the fibres of the diaphragm inserted into it. (*Lancet*, June 23, 1883.)

**The Internal Use of Glycerine.**—In a recent *thèse de Paris*, M. Tisne (*Journal de Thérapeutique*, April 25) gives an account of the results of the employment of glycerine by Drs. Jaccoud and Ferrand. The former prescribes it as a stimulant to the digestive organs in the non-febrile stage of phthisis, when for any reason cod-liver oil ceases to be tolerated. The following mixture is given daily in two or three doses:—Glycerine, forty grammes, and rum or cognac ten grammes, with one drop of essence of mint. This aromatic alcoholised compound, of agreeable flavour, is well tolerated by the stomach, and even after long uninterrupted use it causes neither satiety or disgust. The addition of the rum or brandy has simply in view the modification of the insipid taste of the glycerine, and to assist its digestion. The amount of the glycerine may be raised to fifty or sixty grammes, but only in persons who do not exhibit any signs of abnormal excitability of the heart or nervous system; and restlessness, unusual loquacity, obstinate insomnia, or an increase of temperature announce that the proper dose has been exceeded. Dr. Ferrand makes daily use of glycerine in his wards at the Laennec, and it is found to be readily absorbed without producing any toxic effects. It diminishes constipation in almost all cases, and yet moderates diarrhœa when it is present; and under its use sleep becomes calmer. It has an evident effect on nutrition, its employment in most cases leading to an increase in weight after the first fortnight. In tuberculous cases it induces a considerable amendment in the functional manifestations of the disease, such as dyspnœa, cough, and sweating. The expectoration is the symptom which is least influenced. The local condition of the lung also remains stationary, and the physical signs undergo no change. The action of glycerine on the liver is exhibited by the increase of its size and by the more abundant flow of bile. With respect to its action on the kidneys, there are observed a more abundant diuresis, and an absolute and relative increase of the urea, chlorides, and phosphates eliminated by the urine. In affections of the genito-urinary organs, M. Tisne has found that under the use of glycerine the alkalescence of the urine seems to diminish, while purulence, when present, becomes considerably lessened. (*Med. Times.*)

**Local Origin of Malignant Growths.**—Mr. Jonathan Hutchinson writes as follows on the nature and scope of the local influences which induce malignant action. "The more we investigate, the more clearly will we see that all inflammations are really infective, and that inflammatory processes may pass by almost insensible gradations into those of malignancy." It is not so much senility of the entire organism as local senility (an old age of the tissues concerned, which is premature, and does not correspond with that of the body as a whole) that is almost always necessary to the production of cancer; exceptions occurring, however, in cases due to the influence of inheritance. Tissues and organs which are just passing out of use are those most prone to develop cancer. As to the *inheritance* of cancer, it has been urged that a disease which is capable of inheritance must be a constitutional one. This is true to some extent; but Mr. Hutchinson says that a peculiarity of cell-structure generally is inherited, not germs, not a blood-malady, but a special type of cell-organisation, admitting with greater ease than in other persons the injurious influences of local causes. The "rodent ulcer" of the face is looked upon by the author as a form of morbid action which stands half way between common inflammation and cancer. There is also a distinct proneness possessed by parts formerly affected by syphilitic inflammation to become affected by some malignant growth. In conclusion, Mr. Hutchinson urges the adoption of his doctrine of a pre-cancerous stage, where surgical interference is necessary and ought to be insisted on, before the growth takes on any definite form except that resembling ordinary inflammation, and before the neighbouring lymphatics are affected; without this he sees no hope of any improvement in the reduction of the mortality of cancer. In the debate which followed the reading of the paper, Sir James Paget drew attention to the marked influence which inheritance had on the production of cancer without any special local existing cause. (*Brit. Med. Journ.*, March 24, 1883.)

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# Department of Public Health.

## THE PREVENTION OF CHOLERA.

THE epidemic of cholera in Egypt has excited considerable alarm in most European countries, and although we in England have happily not given way to panic, yet, both on account of our political relations with Egypt, and by reason of the large amount of traffic which passes through the Suez Canal to English ports, the situation is one of grave interest and concern to us.

With one single exception, cholera has heretofore reached our coasts from the Baltic ports, that exception being an outbreak which, commencing in Egypt in connection with the return of the Mohammedan pilgrims, spread along several lines of steamboat communication diverging from Alexandria, infected many of the ports in the Levant and Southern Europe, and ultimately reached Southampton, where some sixty cases occurred between the months of August and November, 1865. The disease, as will be remembered, reappeared in the following year, 1866, England being infected in many different directions, and especially so in the East of London, where a very serious epidemic prevailed. On this exceptional occasion the infection to which Egypt was subjected was not due to steam traffic between India and that country, but rather to the epidemic then prevailing in the Hedjaz; and as regards the present outbreak which commenced at Damietta, there is an absence of any evidence to show that it was brought about by reason of any communications existing between India and Egypt. On the contrary, as recently pointed out at a meeting of the Epidemiological Society, by the president, Dr. Buchanan, F.R.S., the existing prevalence did not appear on the line of traffic between Asia and Europe.

Since 1865 one very important change has taken place in regard to the traffic between Europe and the East, namely, the opening in 1869 of the Suez Canal. That channel of communication has, however, never yet, during the thirteen years of its existence, been known to act as a means for conveying the infection of cholera into Europe; and further, its existence should in one very essential respect act rather as a protection than as a source of danger to the West. Formerly when the overland route was in use, the means for the spread of infection by human intercourse were, to say the least, very tangible; now, on the other hand, vessels can pass direct from Bombay and other Indian ports into the Mediterranean without so much as touching Egyptian territory, and under present arrangements even the coaling of vessels from Port Said is effected at sea by means of a fleet of hulks. According to our experience the spread of cholera is distinctly dependent on human intercourse, and hence it must be regarded as a matter of satisfaction that the unbroken water-line now existing between us and our great Eastern dependency has done away with the need for any land passage across Egypt.

Nearly all European nations but ourselves have now enforced quarantine measures against Egypt. Except for the purposes of relieving our maritime commerce from disabilities, we have long since abandoned that practice, as to which we may recall the words which Mr. Simon, F.R.S., C.B., wrote in his official report for 1865: "A quarantine, which is ineffective, is a mere irrational derangement of commerce; and a quarantine of the kind which ensures success is more easily imagined than realised. Only in proportion as a community lives apart from the great highways and emporia of commerce, or is ready and able to treat its commerce as a subordinate political interest, only in such proportion can quarantine be made effectual for protecting it. In proportion as these circumstances are reversed, it becomes impossible to reduce to practice the paper-plausibilities of quarantine. The conditions which have to be fulfilled are conditions of national seclusion, and the fulfilment of such conditions by England would involve fundamental changes in the most established habits of the country." Mr. Simon goes on to show that quarantine purporting to be effectual must necessarily refuse to admit all the healthy as well as the sick, at least until the former have submitted to a process of detention long enough to cover the incubative period of the disease, and this without any of them having either sickened or suffered from any suspicious symptoms. If, however, disease should manifest itself in even a single one among the healthy, the whole process has to be repeated, the period of probation recommencing again and again until a sufficiency of time has elapsed since the last attack. In short, no system could be much more cruel in its operations, and it deservedly calls for "contempt for the narrow self-protectiveness which it represents." But apart from these considerations it can rarely succeed, and its most obvious failures have occurred in countries which cling to it the most tenaciously. Of such failures the Egyptian one of 1883 will remain one of the most marked. The restrictions with which quarantine would embarrass communities are eluded, "contraband of quarantine, like ordinary smuggling, is developed as soon as the interests for it are considerable," and the restrictions become little better "than elaborate illustrations of leakiness."

Quarantine having been practically discarded, what measures of defence are adopted to prevent the introduction into this country of diseases, such as cholera, which may be imported from abroad? The system we have relied on ever since 1858, when the futility of quarantine for such a purpose was abundantly shown, is what has been described as a "system of medical inspection," the essential features of which are an adaptation to foreign diseases of the provisions of the Public Health Act relating generally to the prevention of our ordinary dangerous infectious disorders, supplemented by certain special restrictions and regulations which were originally embodied in an order issued by the Local Government Board on the 17th of July, 1873, when cholera was prevalent in certain parts of continental Europe, and which are repeated with certain modifications in a re-issue of the Order on the 12th July, 1883. The Public Health Act, 1875, which is in operation elsewhere than in the metropolis, and the Sanitary Act, 1866, within the metropolis, provide (1) for the erection by sanitary authorities of hospitals for the reception of the sick; (2) for the removal thereto of any persons suffering from any dangerous infectious disorder who are situated, among other places, "on board any ship or vessel;" and (3) for the making of regulations as to the removal and detention of such persons. In addition to these provisions such authorities have, under the same Acts, ample powers as to disinfection, as to preventing the exposure of infected persons and things, as to the erection of mortuaries, and as to the provision of a staff of sanitary officers to aid them in carrying the Acts into execution. These measures being provided, the Order of the 12th of July, 1883, becomes of the utmost value. It admits of the detention by the Customs' officer of every vessel upon which a case of cholera or of choleraic diarrhœa has occurred, or is suspected to have occurred, until the vessel and also its crew and passengers have been duly submitted to medical examination by one of the port medical officers. It sanctions the detention of the vessel by the latter officer both for the purposes of this examination and for carrying out any needed processes of disinfection. And, further, it enables the authority to subject the healthy to a detention on board for a time sufficient to learn the state of their health, after which they are free to land.

This system of medical inspection, unlike that of quarantine, is limited, so far as vessels are concerned, to those as to which there are reasonable grounds for suspecting that disease has actually occurred; and with regard to individuals, its restrictions, except for the mere purposes of medical examination, attach solely to those who are actually sick or who are suspected of being sick. In this way the sick are removed from among the healthy; the latter thus escape further chance of infection, and trade and commerce are interfered with as little as is compatible with the interests of public health. But we ought, for the purposes of cholera, to be provided in England with many other substantial safeguards. Cholera is a disease which seems only able to spread in so far as it meets with conditions of filth very similar to those which are associated with the spread of enteric fever, and it has long been a special aim of our sanitary administration to provide, not only for the regular and systematic removal of those nuisances, excremental and other, which are especially identified with prevalences of that affection, whether they occur on land or on board-ship, but to secure such permanent improvement in the conditions under which the general population, and the population afloat, are living as to render impossible the recurrence of such nuisances as tend to endanger health. How far success has followed on the legislation which has had these objects in view, depends upon the method in which the several statutory provisions have been carried out. But if for want of proper means of isolation, disinfection, &c., our port authorities now find themselves unable to perform the sanitary duties cast upon them, and if, owing to a general failure to rid themselves of conditions calculated to favour the spread of an imported infection, any of our towns still retain in their midst the means favourable to the cultivation and propagation of the cholera poison, the fault lies with them, and they have no right now to demand that restrictions, oppressive and vexatious as are the quarantine regulations, shall, because of their default, be imposed on the general community. Cholera has on each of its appearances in this country given an impetus to sanitary work, from the effects of which we are now profiting, and it is to be hoped that the mere rumour of its possible approach to our shores may on this occasion suffice to lead careless and parsimonious authorities to make no further delay in placing the sanitary defences of their respective districts in such order as will enable them effectually to deal with any imported infection.

## ON THE INTERPRETATION OF THE RESULTS OF THE CHEMICAL ANALYSIS OF DRINKING-WATER.

In the recently issued Annual Report of the Medical Officer of the Local Government Board, is presented a report by Dr. Robert Cory, "On the Results of Examination of Certain Samples of Water Purposely Polluted with Excrements from Enteric Fever Patients, and with Other Matters." The purpose of this inquiry has been, we are told, to test the capabilities of methods of chemical analysis at present in use, for the detection of dangerous organic contamination.

Dr. Buchanan, in his preface to this report, remarks upon the tendency shown by sanitary authorities to overrate the value of chemical analysis as affording evidence in proof of the organic purity of drinking-water; and in cases where even manifest possibilities of pollution exist, to accept as conclusive the results of a favourable quantitative analysis, oftentimes in blind disregard of circumstances of locality likely to affect it.

It is, then, I presume with some hope of correcting a fallacy which underlies this state of things that the inquiry under notice has been undertaken, in which the Department has sought to gain at its own instance, experimental proof of a kind enabling it to deal with the subject *ex cathedrâ* in the proper exercise of its functions of advice and instruction to the sanitary authorities of the country.

*At its own instance*, inasmuch as on the chemical side, the whole question of the analysis of potable waters and the right interpretation of the results has, for some dozen years or more, been a field of fruitful activity, and processes are now applicable to the estimation of the organic constituents and mineral products of their decomposition, leaving, as Dr. Frankland had already in 1868 remarked of the processes employed for the determination of the ordinary mineral constituents of natural waters, very little to be desired. And on this side there is certainly no lack of experimental proof of the same order as that which Dr. Cory, working at the matter from a strictly sanitary point of view, has lately adduced.

The report itself, which is also accompanied by notes of the microscopical examination by Mr. Stewart of the various samples submitted to analysis, is a welcome and important contribution to the subject.

For his purpose, Dr. Cory prepared a series of waters artificially contaminated by the addition to equal volumes of known amount of different organic matters, consisting, with one or two exceptions, of typhoid discharges, healthy excrement, and urine. These matters were added to ordinary tap-water, samples of which, together with the polluted water, were then submitted to analysis.

In this way the conditions of experiment were made to approximate as nearly as possible to those under which water subject to contamination by common or specifically infected filth, may be assumed to usually present itself in the course of a sanitary investigation. It may be noted that the actual proportion of such impurities in the several infected samples was probably in excess of what we have reason to believe may commonly be effective in causing disease, certainly in enormous excess of what on a particular occasion did produce disease,[1] and therefore quite favourable to recognition and quantitative expression by the methods of chemical analysis employed. There were altogether about fifty samples of water thus prepared submitted for examination to Dr. Dupré, by whom the "albuminoid ammonia" process was used, supplemented in some cases by a determination of organic carbon and organic nitrogen in the water residue by the methods of Dupré and Hake and of W. Dittmar respectively.

In four instances duplicate samples, one of tap-water and three of such water polluted with egg albumin, urine and typhoid discharges, were also submitted to Dr. Frankland, who employed the Frankland and Armstrong process for determining organic carbon and nitrogen in the water residue.

And in one instance samples of tap-water, *au naturel*, and polluted with typhoid matters, were sent simultaneously to Dr. Frankland and Mr. Wanklyn, part author and the chief exponent of the "albuminoid ammonia" process.

In proceeding to discuss the value of some of the indications of the organic quality of drinking-water furnished by the processes thus tested it will be convenient in the outset to clear the way for a right conception of their respective merits by referring shortly to their essential features. The principal processes of water analysis in general use are the combustion process and the "albuminoid ammonia" process, each having for its special object the estimation of the organic constituents dissolved in the water under examination.

Now, there is no method by which the total amount of such organic matter can be determined. In the earlier days of water analysis a determination of this kind was indeed attempted by ignition of the residue left on evaporating a given volume of the water to dryness. The loss in weight was supposed to indicate the presence of organic impurity. How far this was even roughly approximate to the truth may be judged by the fact that loss of weight may occur from decomposition of unstable, or the expulsion of volatile, inorganic salts in a water yielding no trace of organic matter.

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[1] "Inquiry of Dr. Thorne Thorne into Outbreak of Typhoid Fever at Caterham and Redhill," *Report of Medical Officer for the Year* 1879.

All that is possible in regard to the determination of organic matter is to estimate the amount of one or both of its constituent elements—carbon and nitrogen. In the combustion process of Frankland and Armstrong this is done by a simple application of the method of ordinary organic analysis to the water residue. The carbon and nitrogen are simultaneously evolved as free nitrogen and carbonic acid, and from the measured volumes of these gases the weights of combined carbon and nitrogen in the organic matter originally present are calculated.[1]

As modifications of the process, devised for the saving of time and manipulative skill required in gas analysis, Dupré and Hake determine the organic carbon by passing the carbonic acid through baryta-water and converting the resulting barytic carbonate into sulphate which is weighed in the usual way; and Dittmar and Robinson evolve the organic nitrogen as ammonia, which is absorbed in dilute hydrochloric acid and estimated by the Nessler-test.[2]

Organic matter may be of vegetable or animal origin, and it is, above all, the latter that we wish to determine; not because, as formerly believed, this sort of organic matter, whether of animal or sewage origin, is harmful in itself, but that it indicates the open door for the chance entrance of specific poison. Evidence of the presence of animal matter is sought for in the relative proportions in which the organic nitrogen and organic carbon occur, inasmuch as the ratio of nitrogen to carbon is much greater in the one case than in the other. Special importance has therefore always been given to the determination of the nitrogenous constituents of organic matter in water.[1]

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[1] "On the Analysis of Potable Waters," by E. Frankland and H. E. Armstrong, *Journ. Chem. Soc.* (1868), vol. xxi. p. 77. *Handbook of Water Analysis*, Frankland, 1880.

[2] "On Two New Methods for the Estimation of Minute Quantities of Carbon," by A. Dupré and H. Wilson Hake, *Chem. Soc. Journ.* (1879), vol. xxxv. p. 159. "Determination of the Organic Matter in Potable Waters," by W. Dittmar and H. Robinson, *Chem. News* (1877), xxxvi. 26—29.

In the Sixth Report of the Rivers Pollution Commission (*Domestic Water Supply of Great Britain*, 1874) Frankland, as the result of numerous determinations, gives the average proportion of nitrogen to carbon in spring water holding only peaty matter in solution at 1 : 11·93, in the water of shallow wells polluted by sewage and drainage from privies and cesspools at 1 : 3·126, and in fresh sewage at 1 : 2·1.

Unfortunately, however, for the universal applicability of this test, oxidation affects these ratios of carbon and nitrogen in such a manner that, while in the case of vegetable organic matter the carbon disappears more rapidly than the nitrogen, in animal matters the nitrogen disappears more rapidly than the carbon.

Of the result, Frankland remarks : "This concentration of nitrogen during oxidation assimilates oxidised vegetable to unoxidised animal organic matter in chemical composition, so far, at least, as the proportion between the chief elements, nitrogen and carbon, is concerned. There is, however, still a considerable difference in this respect between these two kinds of organic matter ; but even this disappears when the water containing animal organic matter is subjected to oxidising influences ; for whilst vegetable organic matter suffers a concentration of nitrogen during oxidation, animal organic matter exhibits as a rule a concentration of carbon, and a diminution in the proportion of nitrogen under the same influence." The difficulties thus created are, to a certain extent, overcome by a determination of the products of this transformation, nitrates, nitrites, and ammonia. These mineral compounds, the skeleton as they may be regarded of previous sewage or animal matters, are almost wholly derived from such sources. But here again fresh difficulties are encountered as regards the completeness of the evidence furnished by those salts owing to the changes to which they in turn are exposed under various influences.

Passing now to a consideration of the "albuminoid-ammonia" process of water analysis, this method is founded on the fact that nitrogenous organic matters when boiled with a strongly alkaline solution of potassic permanganate are decomposed, evolving part of their nitrogen in the form of ammonia. It may be well to remark that the authors in describing their process distinctly affirm that it is designed for estimating *the relative quality* of drinking-water, and not for the determination of the *absolute amount* of organic nitrogen present. They point out that the ammonia evolved in the process is not *the whole* but merely *a fraction* of the whole of the ammonia which the nitrogenous organic matter is capable of yielding. But it is claimed that the action of the alkaline permanganate is perfectly definite, and that the ratio between the ammonia evolved and the amount of a given nitrogenous organic substance is a constant one.[1]

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[1] *Report to the General Board of Health on the Metropolis Water Supply in* 1856, by Hofmann and Blyth.

This ratio varies widely with different nitrogenous substances, as the authors show in their experiments with substances of known composition. Hence it is evident that in its application to water analysis, a determination of the relative quality of different samples is only possible when the organic matter present is of the same kind, and in the case of samples which might happen to contain different organic substances, each with its own ratio of nitrogen evolved as ammonia to residual nitrogen, no such comparison is available. The process is therefore admittedly a *qualitative* one.

For reasons just stated, a comparison between the results of the ammonia process, and those furnished by the combustion process cannot strictly be made. On contrasting the organic nitrogen yielded as ammonia by the former method with the absolute amount obtained by combustion, Frankland and Armstrong found as a rule, that the nitrogen obtained as albuminoid ammonia was an extremely irregular fraction of the total nitrogen. Now from this one might naturally have surmised that the vanishing point of the albuminoid-ammonia process for the detection of organic nitrogen at all would have been reached, well within the limits of accurate performance, by the combustion process. But Frankland and Armstrong established the important fact that, "in some cases where as a rule the amount of organic nitrogen was very small, the two processes yielded accordant results."[1] Here, then, we have accuracy even in quantitative terms, unexpectedly cropping up when least expected, but when most to be desired, for at the other end of the scale with larger quantities of organic contamination, the inability of the process to determine the *absolute* amount or to disclose with accuracy the *relative proportions* of organic nitrogen in different samples, is of small consequence in pronouncing for sanitary purposes upon the organic quality of a natural water.

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[1] "Water Analysis. Determination of the Nitrogenous Organic Matter," Wanklyn, Chapman and Smith, *Journ. Chem. Soc.* (1867), xx. p. 445. "Verification of Wanklyn, Chapman, and Smith's Water Analysis in a Series of Artificial Waters," *Ibid.* 591. *Water Analysis*, Wanklyn and Chapman, 1879, 5th edition.

The kind of evidence which in actual practice is likely to be afforded by this process, is on the whole well exemplified by the results obtained in Dr. Cory's series of experiments with artificially polluted waters.

A few examples may be given.

Tap-water which had been infected with typhoid discharges in the proportion of 1·75 grains and 3·5 grains per gallon, yielded the following amounts of albuminoid ammonia:

| | Grains per Gallon. | Parts per Million.[2] |
|---|---|---|
| (1) | ·0095 | ·136 |
| (2) | ·0123 | ·176 |

The unpolluted tap-water yielded:

| Grains per Gallon. | Parts per Million. |
|---|---|
| ·0075 | ·107 |

The increase of albuminoid ammonia due to added typhoid material is in the one instance ·002, and to the second ·0048 grains per gallon, the *relative* proportions of pollution being therefore accurately indicated within the limits of experimental error.

Tap-water contaminated with typhoid discharges (from a different source than in the above experiments), in the proportion of 3·5 grains and 5·21 grains per gallon, gave the following amounts of albuminoid ammonia:

| | Grains per Gallon. | Parts per Million. |
|---|---|---|
| (1) | ·0101 | ·144 |
| (2) | ·0140 | ·200 |

The original tap-water gave:

| Grains per Gallon. | Parts per Million. |
|---|---|
| ·0056 | ·08 |

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[1] *Chem. Soc. Journ.* (1868), vol. xxi. p. 100.

[2] This mode of expressing results has been adopted by the authors of the ammonia process, being the number of milligrammes per litre, *i.e.* per million milligrammes.

Deducting the latter amount of albuminoid ammonia from the amounts yielded by the infected samples, increments of ·0045 and ·0084 grains per gallon respectively are obtained, being closely proportional to the relative quantities of added pollution.

In a third series of experiments, samples were prepared by the addition of the clear filtrate from typhoid discharges mixed with water in such amount that the pollution was equivalent to ·209 grains, ·258 grains, and ·518 grains of dried soluble matter per gallon. The results as regards albuminoid ammonia in the first two instances are practically identical, as might have been expected from the small quantities of substances dealt with, and the limits of allowable experimental error, but in the third quite disproportionate, being some six times the amount yielded by the other two.

Other experiments are given in which urine and healthy excremental matters were the polluting materials employed, showing a remarkably constant ratio between the increment of those on the one hand, and of the albuminoid ammonia on the other. Some of these experiments also illustrate what I have previously mentioned as a feature of the ammonia process, that there is not a complete conversion of the whole of the organic nitrogen into ammonia.

In one experiment where healthy excrement was used, Dr. Cory notes that a larger amount of albuminoid ammonia was yielded than by a corresponding amount of typhoid dejection. This difference, judging from the circumstance that the volatile matters are stated in Dr. Dupré's analysis at nearly twice as much in the former as in the latter, would appear to arise probably from the larger amount of soluble nitrogenous organic matter present in the healthy excrement. The subject of the experiment, too, had been for some four days previously upon a milk and beef tea diet, in order that the conditions of experiments might be as nearly as possible alike to those under which the contrasted typhoid discharges were obtained.

The result was therefore quite in accordance with previous knowledge as to the inability of chemistry to distinguish between healthy and specific excremental contamination of drinking-water.

(*To be continued.*)

THE PRACTITIONER.

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## Original Communications.

# ON THE CONDITION OF THE URETHRA AND NEIGHBOURING PARTS IN ACUTE GONORRHŒA.

BY D. J. HAMILTON, M.B., F.R.C.S.E.

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ALTHOUGH perhaps there is no subject of which more has been written from the clinical point of view than that of gonorrhœa and its sequelæ, strangely enough the literature of its pathology is singularly deficient. A congestion of the mucous membrane of the urethra, limited to a particular spot in the course of that channel, or affecting the greater part of its extent, is almost all that is given in works on the subject as to what actually occurs after the gonorrhœal poison is applied and begins to exert its specific influence. This has resulted in great part from the difficulty in procuring material for examination. It is usually only in cases of sudden death of a person affected with the disease that we have a chance of examining the parts, and even then, unless the person has been known during his lifetime to have suffered from it, the appearances at the post-mortem examination are apt to be overlooked. The following case being a particularly favourable instance for studying the disease, I have thought it worth while to put it on record.

The patient (a male) from whom the preparations were taken was admitted to the Edinburgh Royal Infirmary on September 24, 1882. It seems that he had been wounded in the chest and face during a brawl, and on the morning following admission it was found that the parts around the wound were emphysematous, apparently from injury to the lung. He died on October 2, from pleurisy consequent upon the penetration of the pleural cavity. During the time he was in hospital it was noticed that he had an acute gonorrhœa, but how long this had lasted I was unable to ascertain. At the post-mortem examination a copious purulent discharge was noticed coming from the orifice of the urethra, so that, at all events, the disease could not have been of very long duration. It had all the appearances of being in the acute stage.

The penis, testicles, and epididymis, were secured and placed in Müller's fluid for several weeks, the hardening being subsequently completed by methylated spirit. The parts were beautifully fixed by this means, so that sections could be made of the whole penis by the freezing microtome.

In a series of articles formerly published in this journal I drew attention to what occurs in the bronchi during an acute and chronic attack of catarrhal bronchitis. I therein showed that the epithelial covering of the mucous membrane is the part which is chiefly implicated in the commencement of an acute attack. In the normal bronchi of middle calibre there are three strata of epithelium—a deep flat cell layer, an intermediate pyriform set of cells, and a superficial ciliated columnar stratum. My observations went to show that the first of these, the deep flat cell layer, is the one which is chiefly influenced in acute bronchitis. Its cells proliferate, and the resulting progeny of small round cells is thrown off from the bronchus, mixes with an increased mucous discharge from the glands, and that the two constitute the bronchial expectoration.

The greater part of the urethra is lined by columnar epithelium. A small portion at the commencement and termination alone have a flat cell covering. Hence one would expect that there would be a certain amount of analogy between acute catarrh of the urethra and that of the bronchi. The epithelial covering is made up of three strata as in the bronchus. The deepest of these is composed of flat endothelium-like cells, corresponding to what is called Debove's membrane in the bronchus. The nuclei of this layer are well seen in transverse sections of the urethra when the more superficial cells are brushed off. The intermediate layer is composed of pear-shaped cells, whose ends are implanted among those of the deepest stratum; while that which is nearest the surface is composed of completely formed columnar cells. Here, also, as in the bronchus, the deepest flat cell layer is the source of the other two under natural conditions. Its cells divide, and from the resulting new cells are formed those of the pear-shaped intermediate stratum, while the latter in course of time become expanded into the fully grown columnar cells.

In acute gonorrhœa the process is an exaggeration of that which goes on normally. The deep layer of epithelium is unduly stimulated apparently by the action of the irritant applied; its cells divide too quickly. Time is thus not afforded for the complete elaboration of the columnar cells, but an embryonic progeny is thrown off into the urethral lumen constituting the cells of the discharge.

The first point which strikes one on looking at a section of the urethra is that the morbid changes are almost exclusively confined to the epithelial surface. In a logwood stained preparation this is specially striking, as the embryonic cells of the epithelial lining colour deeply with this reagent, marking their presence with great exactitude. In Fig. 1 is shown the mucous surface of a fold of the urethra magnified about 350 diams. The upper and lower surfaces of the canal were closely united, being in a manner glued together by the viscid discharge. There was not any lumen noticeable with the naked eye on transverse section of the penis, unless towards the furthest back segment.

On looking at the epithelial surface it will be noticed how extensive the changes are within it. In place of the normal three strata of cells there is in some parts only one; in others a confused mass of rounded and pear-shaped embryonic bodies lies above this. The one stratum which is always present is the deepest of the three, or that which, when looked at from above, in normal circumstances, has a squamous or endothelium-like appearance. Its cells, however, rapidly lose this flat shape, and become more or less rounded (*a*). Their nuclei are particularly large, very granular, and stain deeply in logwood. The whole of the mucous surface was entirely covered by this deep germinating layer of epithelium. There did not seem to be any parts which were entirely denuded. Only a few of the resulting embryonic cells thus formed went on to form the intermediate cells of the pyriform type. In some places there was no attempt at this, in others, of which the figure represents an average specimen, a few of them had elongated. By far the greater number of the cells resulting from the stimulation of the deepest layer of epithelium were thrown off in their embryonic rounded condition as pus cells. In the figure these can be seen heaped up in masses in some parts, becoming

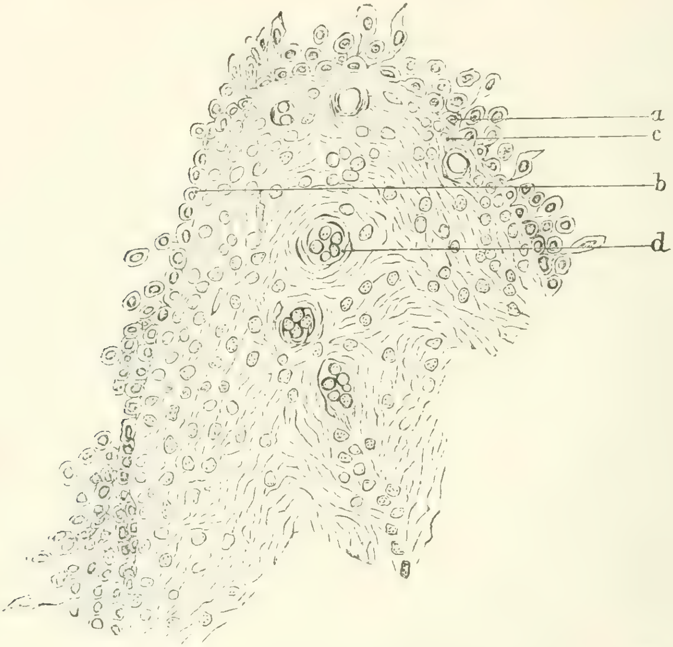

FIG. 1.—Transverse section of urethra, acute gonorrhœa, showing a fold of mucous membrane ; × 350 diams.—*a*, germinating deep layer of epithelium ; *b*, the same more exposed ; *c*, small-cell infiltration of mucosa ; *d*, blood-vessel of mucous membrane containing a few leucocytes.

detached in others so as to constitute the cellular part of the discharge. It can be thus easily understood why the pus cells in the discharge from the urethra contain, as in bronchitis, only a limited number of columnar cells. These are not developed. The stimulation of the epithelial surface is too great, and consequently those cells which should have gone on to form them are desquamated as soon as they are separated from the parent. The copiousness of the cellular products in the discharge can be easily accounted for when we consider that in most cases the greater part of the urethra is in the condition shown in the figure.

The characteristic scalding pain on micturition is also well accounted for. The proper protective covering is destroyed, and the urine in passing along the channel irritates the denuded surface.

The mucous glands evidently participate in the disease, in so far as their secretion appears to be much exalted. Their secreting cells are converted into large rounded transparent bodies from the accumulation of mucus within them. The gland channel is also filled with mucus and evidently distended. As I described in my work on bronchitis, this is similar to the state of the glands in the bronchial mucous membrane during an attack of acute catarrh, so that I think the source of the discharge in both cases appears to be alike, namely, that the cellular part of it is derived from the epithelium, while the fluid part is simply an increase of the natural secretion of the mucous glands.

In the human urethra there is not the same elastic basement membrane as in the bronchi, hence there is nothing to hinder inflammatory exudation in the mucous membrane from passing into the urethral lumen. The mucous membrane in gonorrhœa contains a considerable quantity of cellular effusion. The cells can be seen to be mainly limited to this particular locality, but long rows of similar cells extend thence into the substance of the corpus spongiosum, along channels lined by endothelium, and evidently representing lymphatics. These inflammatory cells are shown in the figure at *c*. Many of them seem to be leucocytes, others can be seen springing from the connective fibrous tissue of the mucous membrane. They were not specially abundant round blood-vessels. A question comes to be whether these get on to the free surface of the membrane. I have looked carefully for evidence of this, and am inclined to believe that, if any of them do so, it is only a limited number, and that this occurs only where the cellular accumulation within the mucosa is excessive. It is a very difficult point to settle, but taking the difference in size of the cells within the mucous membrane and those on its surface into account, it seems very doubtful whether any exudation into the canal actually takes place. The whole appearance of the mucous membrane in this catarrhal inflammation is totally different from that of one which is interstitial in its origin. The slight cellular exudation into the fibrous spaces of the mucosa is similar to that seen in acute bronchitis, and I think it much more probable that, instead of the cells being forced out on the mucous surface, they are carried along in the lymph current up towards the nearest lymphatic gland. The direction which the cells follow, moving as they do in lines from the mucosa into the trabecular tissue of the corpus spongiosum, points to the above as being the means by which the cellular effusion into the mucosa is removed.

It might have been expected that the blood-vessels of the mucous membrane would have been congested. In the case which I have recorded they were not markedly so. They contained a fair but not a superabundant amount of coloured blood-corpuscles. Nor were they much dilated, the only abnormality noticed within them being, as shown in Fig. 1 at *d*, that groups of three or four leucocytes were found entangled within them.

The trabecular tissue of the corpora spongiosa and cavernosa did not show any abnormality, but within the cavernous spaces there were large accumulations of leucocytes into masses usually adherent to the wall of a space. These were evidently small "white clots," and seemed to have been formed during life. The spaces also contained a small number of coloured corpuscles in some parts, in others they were distended with blood.

What the condition of the urethra is when the disease becomes chronic and a stricture results I am unable as yet to say. I should think, however, that it is similar to what occurs so often in chronic bronchitis, namely, that the submucous tissue becomes cirrhosed and contracts upon the non-resistant lumen. Here, there being no fixed point, as in the case of the chest, to which this cirrhosed tissue might become attached, the invariable result of such a fibrous growth round the urethra is stenosis. Were the textures of the penis more rigid, there is no reason why a dilatation of the urethra—a true urethrectasy—should not result.

*The testicles* showed appearances which were interesting as corroborative of the superficial and epithelial character of the morbid changes in the urethra. The epithelium of the normal seminal tubes usually consists of several layers of polyhedral cells arranged in regular order within the membrana propria of the seminal tubes. In the testicles taken from this man the tubes showed distinct evidence of catarrh. A drawing is given in Fig. 2 of the appearance presented by the tubes. The catarrhal state was noticed in nearly every tube, in some more than in others. In the first place it will be noted that the interstitial tissue is entirely free from any evidence of inflammation. Its vessels contained a medium not an abnormal amount of blood. A capillary filled with coloured blood-corpuscles is shown at *c*, but it was exceptional to find so many corpuscles within the capillaries as shown in the drawing. There was not any hyperplasia of the fibrous tissue, nor was there any abnormal effusion of inflammatory cells into it.

On looking at the contents of the tubes (*d*), however, evidences of catarrh similar to those of the urethra are distinctly visible. The layers of epithelium covering the membrana propria have been actively proliferating. The cells formed thereby have been thrown off in great numbers into the lumen of the tube, and have undergone fatty metamorphosis and in some cases complete disintegration. A quantity of granular débris and minute oil-globules have thus resulted, partially occluding the tube.

In the interstitial tissue between the tubules were observed the usual angular masses of epithelial cells (*b*), and they too seemed to have undergone a certain amount of alteration. The cells within them, instead of being polygonal, were more or less rounded, their protoplasm granular, and the nucleus usually invisible. The membrana propria seemed not to have undergone any appreciable alteration.

I believe that the appearances in the testicle represent the commencement of a catarrh of the seminal tubes. As might be expected, the duration of the catarrh had evidently not been so long as in the urethra, but its evidences were quite characteristic enough to indicate that the processes were essentially alike.

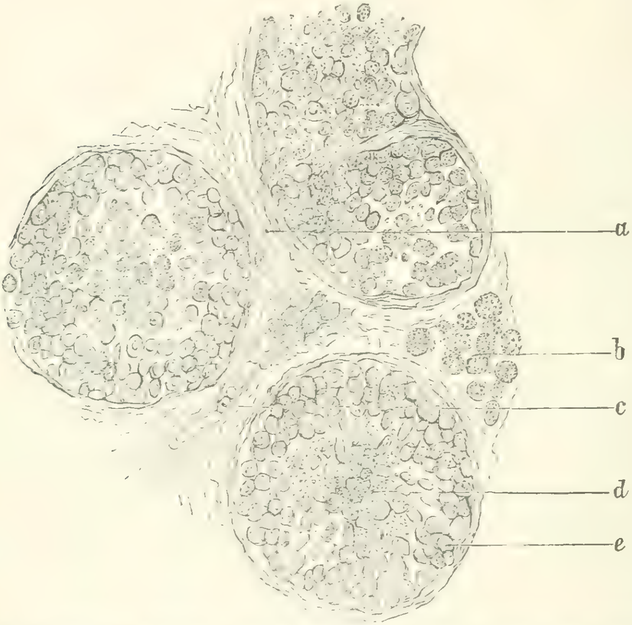

FIG. 2.—Section of testicle, acute gonorrhœa: × 300 diams.—*a*, interstitial stroma of testicle; *b*, epithelial cells (remains of Wolffian body); *c*, epithelium of tubes in a state of catarrh; *d*, desquamated cells of the same; *e*, membrana propria of the seminal tubes.

*The epididymis* showed similar catarrhal appearances, but evidently further advanced than in the tubes of the testis. The epithelium had desquamated in nearly every tube, and had become extremely fatty. It lay in most cases, as a granular mass, in the lumen of the tube, and, as in the testis, appeared in many instances to occlude it.

# ON A PECULIAR DISEASE OF HOT CLIMATES (PSILOSIS LINGUÆ—PSILOSIS MUCOSÆ INTESTINI).

BY GEORGE THIN, M.D.

THE following fragmentary note is written at the suggestion of the editor of the *Practitioner*, with whom I chanced to have some conversation concerning the affection in question.

A disease prevails amongst the foreign residents in many of the Chinese ports, and also, I understand, southwards towards the Straits Peninsula to which the name of "sprew" has been given locally. The nature of this disease still requires careful study. In this country it comes occasionally under my notice, and frequently in connection with its manifestations on the tongue.

The course of the disease as occurring in eastern climates is briefly this:—

A patient who has been a longer or shorter time in these climates—not necessarily a long time, for it sometimes occurs in residents who have recently arrived from Europe—finds that he has to get out of bed in the early morning, and passes a loose, watery motion. He may have one or two similar motions before breakfast; after breakfast he will probably have one or two more. The diarrhœa is painless; the discharge is characteristic, consisting of a watery, thin, straw-coloured fluid. Beyond a slight feeling of debility in the early part of the day, the patient has no further symptoms. The diarrhœa ceases with the morning hours, and the patient's strength improves as the day goes on. In the evening he will probably be quite well: the symptoms again renewing themselves in the early morning of the following day. This state of things may continue for a period of months, or even for one or two years, without producing marked change. If the patient is delicate, after a few months a marked decrease of strength is observed, and he may become very ill. If he is naturally strong it may last even so long as a year without any marked diminution of strength, but invariably sooner or later, if the disease continues, a condition of great debility ensues.

In what may be called the second stage of the disease, dyspeptic symptoms of various kinds manifest themselves: soreness of the mouth, pain in the stomach after food, painful flatulent distention, and sometimes, although not a marked symptom, soreness in the rectum. At the same time there is more or less nausea, loss of appetite, and prostration.

In the third—what may be called the fatal—stage, which may last for a considerable time, the symptoms of marasmus are marked.

During the whole course of the disease the tongue is more or less affected, and the patient is unusually sensitive to hot fluids or acrid substances of any kind: sometimes complaining of soreness over the whole mucous membrane of the mouth, sometimes of localised pain on one or two points of the tongue. The soreness of the mouth varies, being sometimes much more marked than at other times: during the exacerbations the tongue is seen to be redder than usual and raw looking. In advanced cases of the disease it may be smooth and polished in appearance, or rough and cracked, and may from time to time be covered with aphthous deposits. In some cases the prominent symptoms are intestinal; in others the intestinal symptoms are so slight as to be scarcely observed, while the patient complains only of the discomfort connected with the condition of the tongue. Sometimes the whole tongue is the seat of pain and discomfort: sometimes, as has been the case with a patient who was under my care for several years, and who has long returned from China, the discomfort is localised at the point of the tongue. In the case to which I refer the painful part consists of two points on the extreme tip of the tongue, symmetrically situated, not much larger than a pin's head, and bluish in colour, the thin mucous membrane showing a small distended vein below each point.

Patients living in England, and who have become apparently well, are liable to severe recurrences, both of the condition of the intestinal mucous membrane and of the raw state of the tongue when the weather becomes suddenly damp and cold. Some of them who have been quite well during the course of the summer months, experience a recurrence of the disease as soon as the cold November weather sets in. One patient, living in London, who was under my care two years ago, was, on three several occasions during the winter, seized simultaneously with the soreness of the mouth, intestinal irritation, and an intense pruritus of the skin. On inspecting the skin nothing was to be seen except numerous marks of scratching, and the only treatment that alleviated the pruritus consisted in keeping him constantly in bed well covered with bedclothes.

Of the pathological condition of this curious complaint very little is known. It evidently consists in a defect of the formative power of the epithelium of the mucous membrane of the tongue and intestinal mucous membrane, sometimes of the one, sometimes of the other, sometimes of both. Although occurring only in persons who have been in malarial countries, it is not certain that it is due to malaria. To my knowledge it never occurs in persons who have not been out of England.

*Treatment.*—The diet must be carefully regulated, milk diet more or less strict giving the best results. Vegetables and hard indigestible food of all kinds must of course be avoided, milk, arrowroot, raw eggs and beef-tea being advisable. In the worst cases a strict milk diet is necessary. In an aggravated case, which resisted all treatment for eighteen months, the disease yielded entirely to a diet of milk alone, the patient being able, during the course of treatment, to attend to his daily business in the city of London, and consuming from nineteen to twenty-three glasses of milk in the twenty-four hours. The chief inconvenience from which he suffered was the large quantity of urine passed, which necessitated his getting out of bed every two hours during the night. For some months after the mucous membrane in this case began to assume a healthy condition, bread or meat, even in very small quantities, produced a recurrence of the symptoms, which, however, again at once yielded to a milk diet. It was six months before the patient could eat ordinary food, but the cure has remained permanent. During the milk diet he gained weight and flesh, becoming, in fact, heavier than he had ever been previously in his life.

As regards medicinal treatment the chief fact to be borne in mind is that astringents and opiates are useless. The first thing I do is to attempt to produce a secretion of bile, and this object is generally attained by the administration of rhubarb and Epsom salts in small doses. I was first led to adopt this treatment from having observed its good results, many years ago, when given, as recommended by Dr. West, in one of the forms of diarrhœa which occur in children. I usually give from ten to fifteen minims of tincture of rhubarb with eight or ten grs. of Epsom salts in a little syrup of ginger and caraway water two or three times a day. Sometimes I combine with this treatment small doses of quinine with extracts of gentian and taraxacum. In a great many cases, within a few days under this treatment the motions become darker in colour, more consistent and less copious. That part of the mucous membrane which can be seen, viz. the tongue, becomes less irritable, less red, and shows signs of the formation of fur. If the patient is conscientious with regard to diet, in very many cases the improvement is striking and perfect recovery results.

The local treatment of the tongue has been on the whole not very satisfactory. In slight cases I recommend a mouth wash of saturated watery solution of boracic acid several times daily, in the more severe cases combining with it brushing with solution of boracic acid in glycerine and water. Some patients expressed themselves as relieved by the use of weak solutions of chromic acid; solutions of caustics, nitrate of silver, and so on, have not in my experience produced any benefit.

The condition of the tongue must be considered as symptomatic of a disease which affects the whole system, and its amelioration must be looked for by a system of treatment that protects the patient from all depressing influences, and stimulates the constitutional power as far as in the circumstances may be possible; warm clothing, avoidance of too much exercise, great care to avoid wet and damp, the precautions of extra clothing and warm rooms when there is a sudden fall of temperature, are matters of the greatest importance. In the great majority of cases after the patients have arrived in this country, under judicious treatment, the condition of the tongue becomes cured and the general health completely restored; and I have heard from patients who have been under my care in London, and who have returned to the East, that the improvement has so far been permanent.

I am in the habit of forbidding alcoholic liquors of all kinds, and the use of tobacco, and further, the use of any food or drink which, either by temperature or composition, irritates or inflames the mouth. I am bound to say, however, that one or two patients who have done well have never given up entirely the use of stimulants, and have sometimes expressed themselves as believing that they were actually benefited by the use of a little alcohol in a very diluted form.

The term "Sprew" as applied to this disease is likely to mislead. Webster defines *sprew* as equivalent to *thrush.* Jamieson in his Scottish Dictionary states that *sproo* (Teut. *sprouwe*) is applied in the Lothians to an aphthous appearance in the mouths of infants, which is to be distinguished from what is properly called *thrush.* The author feels justified in stating that there is no disease prevalent in the Lothians which approaches in character to the affection to which his remarks are applicable. The term *psilosis* is proposed as expressive of a constant feature of the complaint, the bareness or rawness of the mucous membrane.

# A NOTE ON ROMAN FEVER, AND THE ADMINISTRATION OF QUININE IN SOME CASES CLASSED UNDER THIS TERM.

BY DAVID YOUNG, M.D., ROME.

DURING the past eleven years I have treated in Florence and Rome between three hundred and four hundred cases of fever, comprising intermittent, remittent, and typhoid. My experience during ten years' residence in Florence was somewhat different from what it has been more recently in Rome. In the former city by far the greater number were cases of an adynamic, remittent type, which were oftentimes very difficult to distinguish from a mild form of typhoid, and which corresponded in many points, in their clinical history, to those cases described by Professor Baccelli under the name of "Subcontinuous Typhoid." In Rome, on the contrary, the types met with were intermittent, typhoid, and remittent, the latter, however, presenting much less severe symptoms, and lasting a "shorter" period than those cases with which I was so long familiar in the Tuscan capital. Thus during ten years in Florence, out of three hundred and ten cases, *four* were purely quotidian intermittent, *thirteen* were typhoid, and the remaining *two hundred and ninety-three* embraced the remittent cases as above described, but which my further experience enables me to say must have included a considerable number of cases of *mild* typhoid. Of these three hundred and ten cases, I was able in *nine* of the cases of typhoid only to trace the origin of the disease to Florence ; *all* the others had come more or less directly from the south of Italy. The history which the patient generally gave, in about three-fourths of the cases, was something as follows. After a longer or shorter period devoted to sight-seeing in Rome and Naples, and the neighbourhoods of these cities, he began to feel ill, frequently an attack of diarrhœa ushered in the illness, or he had felt shivery and cold on returning from a hard day's sight-seeing, and in a number of the cases the attack was attributed to exposure in cold wet weather while visiting Pompeii, Herculaneum, or Vesuvius. Feeling thus fairly unwell, he became alarmed lest the illness might become what he called the dreaded Roman fever, and about which he had been so soundly warned; he therefore made a rush away from the south, hoping to find himself well when, having escaped from the fever-stricken districts, he had reached the cooler and more northerly cities of Tuscany or Piedmont. Frequently, either by choice or necessity, he made a halt at some point on the railroad between Rome and Florence, such as Perugia, Assisi, or Siena, but not feeling better he then came on to Florence, only to find himself completely unable to proceed further, and where his symptoms presented the adynamic, remittent features already referred to. Generally speaking, the patient would reach Florence from five to eight days after he had first begun to feel unwell in the south. A careful study of the symptoms, and especially of the temperature, made it in many of the cases, as I have already said, a matter of no small difficulty to decide whether one was face to face with a case of typhoid, or one of neglected remittent; while in others one could with more confidence exclude the typhoid and pronounce the case to be one of remittent fever. However, into this question I have no intention to enter here, my chief object being to refer to the administration and action of quinine in many of these remittent cases, for I have invariably found that, when the fever had been allowed to go on unhindered till symptoms manifested themselves which led me to adopt the name *neglected* remittent, quinine is not only powerless to reduce the fever, but is positively hurtful in other ways, whereas the very same cases, when taken at the commencement in Rome, were usually readily amenable to the action of the alkaloid; and this is just what I had been led to expect when treating these cases in Florence. My experience on this point has made me unhesitatingly advise patients never to run away from Rome when they feel the symptoms of fever coming on, but immediately to submit themselves to treatment, and when thus taken early nothing is more simple to treat or shows itself more answerable to treatment than the majority of cases of remittent and intermittent fevers which, together with "every ill that flesh is heir to," have been included under the dreaded name of Roman fever.

# ON THE PATHOLOGY OF DROPSY.

BY T. LAUDER BRUNTON, M.D., F.R.S.

DROPSY is an accumulation of fluid in the lymph spaces. These lymph spaces may either be *small*, as in the subcutaneous cellular tissue, and in the substance of organs; or they may be *large*, as in so-called serous cavities, the peritoneum, pericardium, pleura, &c.

In the normal condition, these lymph spaces are only moistened with lymph, whereas in dropsy they may contain it in great quantities.

The question before us, viz., the pathology of dropsy, is simply: How has the lymph come to accumulate in these lymph spaces? Supposing that we have a cistern furnished below with two exit pipes which together are much larger than the supply, it will never become full, although the supply pipe should be running night and day (*vide* Fig. 1). The water rushing into it may wet its sides, but will do nothing more. If we close the exit pipes completely, however, the cistern will soon fill, and, if we close them only partially, the rapidity with which it fills will depend upon the extent to which we close the exit pipes and open the supply pipe, or in other words, it will depend upon the relation between the quantity running in and the quantity running out in a given time. This is exactly what we find in the case of the lymph spaces: these are the cisterns, the arteries and capillaries are the supply pipes, the veins and lymphatic vessels are the exit pipes. In health the lymph spaces are merely moistened with lymph because, although constant or nearly constant exudation of lymph is taking place into them from the capillaries, it is at once carried away by the venous radicles and by the lymphatic vessels. In the illustration just given, I have spoken of the cistern as having two exit pipes, which together are much larger than the supply pipe, but I might have spoken of them as being of unequal size, and of one of them alone being much larger than the supply pipe, although the other may not be so. For not only can the venous radicles and lymphatics together carry away all the lymph which is poured out into the lymph spaces; the venous radicles alone are sufficient for this purpose, so that even when the flow of lymph is entirely stopped by ligature of the lymphatics, no accumulation of fluid in lymph spaces may occur.[1] The lymphatics also may to a great extent remove the fluid from the lymph spaces when the veins are obstructed. Thus, as Ranvier and Cohnheim have observed in the dog, and as I have found in the cat, ligature of the inferior vena cava may sometimes produce no œdema whatever in the limbs. This is supposed by Cohnheim to be due chiefly to the establishment of collateral venous circulation.

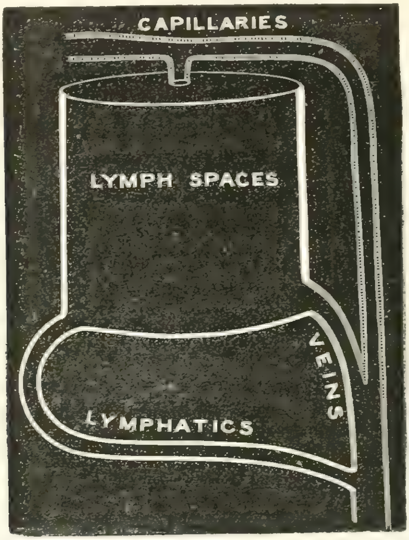

FIG. 1.—Diagram of the relations of the lymph spaces, and vessels.

But on this point I do not feel disposed entirely to agree with him inasmuch as the veins of the surface in my observations were not dilated to the extent that one would have imagined, and I am inclined rather to believe that the prevention of œdema was due in a great measure to increased action of the lymphatics.

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[1] Cohnheim's *Pathology*, second edition, vol. i. p. 485.

Ligature of the veins at once increases the lymphatic stream, as seen in experiments upon animals. When a cannula is inserted into a lymphatic vessel in a dog, the lymph flows in small quantities in slowly succeeding drops with long intervals between. But when the chief vein of the district from which the lymph is supplied is ligatured the lymph flows much more quickly. This may be due partly to the quantity poured out from the capillaries being increased in consequence of the ligature of the vein, but I think we can hardly imagine that it is not in a great measure due also simply to the lymph, which would have been poured out in any case, passing away by the lymphatics when it could no longer be taken up by the veins. It is probable that the proportion of lymph which is removed from the lymph spaces by the veins and lymphatics varies in different individuals.

Ludwig noticed that strong, short-haired dogs yield much lymph. Now if we pat a long- and a short-haired dog we are at once struck with the difference in the feeling of the muscles. In short-haired dogs the muscles are usually hard and well defined, feeling like solid lumps under the skin. In long-haired dogs on the contrary they are soft. We notice similar differences in men, some men having very hard muscles, others very soft. This difference does not appear to affect the muscular power, because it has been found that some of the strongest men are those with soft muscles; and Kühne has shown that the contractile substance of muscle may be regarded as semifluid. The difference between the two sets of muscles lies, not in the muscular substance, but in the fascia by which it is surrounded. In some it appears to be much more developed than in others, and where it is thick it gives to the muscle a feeling of hardness. Now this fascia is a pumping arrangement (*vide* Fig. 2) by which the lymph is drawn out of the muscle and is passed onwards into the lymphatics. It consists of two layers, between which are lymph spaces ending in lymphatic vessels. Each time that the muscle contracts, the inner layer is pressed against the outer and forces the fluid onwards into the lymphatic vessel. Each time that the muscle relaxes, the inner layer tends to fall away from the outer, and thus the lymph from the muscle readily finds its way into it. In the very act of muscular contraction, then, the products of waste are washed out of it by the fresh lymph which flows through it.

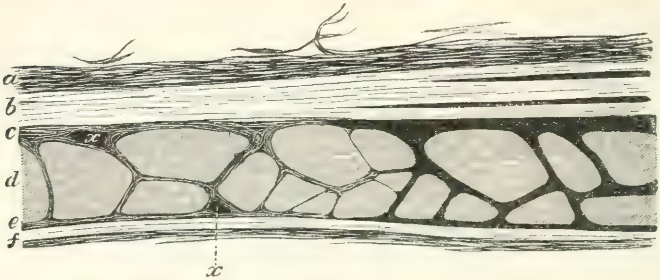

FIG. 2.—Injected lymph spaces from the *fascia lata* of the dog, after Ludwig and Schweigger-Seidel, Lymphgefässe der Fascien und Sehnen. The injected spaces are black in the figure.

This difference in the development of the muscular fascia appears to me, although upon this point I should like to speak with great reservation, to coincide with differences in the tendencies to *muscular* as distinguished from *articular* rheumatism. Where we find the soft muscles due to thin fascia, it has appeared to me that the tendency to muscular rheumatism is greater, whereas those with hard muscles and firm fascia have appeared to me to have a greater tendency to articular rheumatism. This is what one might expect, because, if by over exertion irritant products of waste should be formed in the muscle, they will tend rather to remain there when the fascia is soft, and give rise to muscular pain; while in those whose fascia is hard, they will be removed from the muscle, but may possibly give rise to inflammation in the joints. This point is I think worthy of further attention; and careful observations on it might give us valuable data in regard to the true origin of rheumatism.

In the case of the large serous cavities also, we have other pumping arrangements. In the central tendon of the diaphragm (*vide* Fig. 3) we have two layers which are alternately pressed together and separated by the movements of respiration, so that they pump the lymph from the peritoneal cavity in much the same way as the fascia remove it from the muscles. This is well seen by connecting the trachea of a dead rabbit with an apparatus for artificial respiration, and removing the lower part of the body and hanging the thorax up with the head downwards. A solution of Prussian blue or other injecting fluid is then poured over the lower surface of the diaphragm, and the apparatus for artificial respiration set in motion. Before long the Prussian blue is pumped into the lymph spaces of the diaphragm, which then exhibit a beautiful blue network.

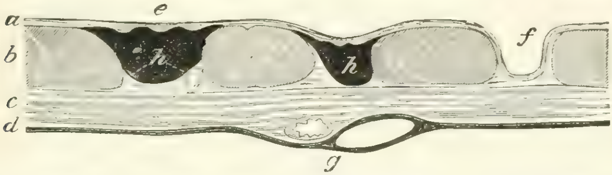

FIG. 3.—Section of central tendon of the diaphragm. The injected lymph spaces, *h* and *h*, are black. At *f* the walls of the space are collapsed. After Ludwig and Schweigger-Seidel, Lymphgefässe der Fascien und Sehnen.

Similar conditions to those in the diaphragm and muscles are to be found in the costal pleura (*vide* Fig. 4). Besides these pumping arrangements in the muscles and in the serous cavities by which the flow of lymph is accelerated, actual rhythmical pulsation has been observed in the lymphatics and the mesentery of guinea-pigs, but have not been found in other mammals or man.

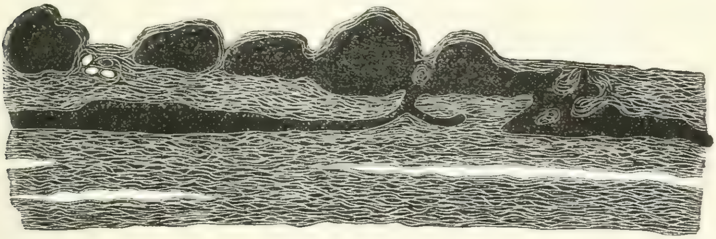

FIG. 4.—Section of pleura. The lymph spaces appear black in the figure. After Ludwig and Dybkowsky. Ludwig's *Arbeiten*, 1866.

We find, however, that there are other conditions which aid the flow of lymph. This flow naturally depends upon the difference of pressure at the two ends of the vessels, and it will be increased by anything raising its pressure in the tissues, or anything diminishing its exit from the lymphatics into the veins. Two things which diminish the pressure in the veins are the inspiratory action of the thorax and the diastolic suction of the heart. The effect of the inspiratory action of the thorax is readily seen when one tries to blow up a fire, for the violent respiratory exertions there required appear to pump either the blood or lymph from the brain and by reducing the pressure to cause giddiness.

When these are imperfect, as, for example, when the right side of the heart is incompletely emptied, and still more when there is tricuspid regurgitation, so that the veins are full, a marked hindrance will be presented to the flow of lymph. It will also be diminished by emphysema, in which, the chest being already barrel-shaped and incapable of much further expansion, the inspiratory suction will be diminished.

To recapitulate shortly the conditions which cause the flow of lymph, we may say its flow depends upon difference of pressure between the two ends of the lymphatic vessels. It is increased by the pressure being raised in the tissues and lowered in the vena cava, and it is retarded by opposite conditions. Where the relations of the tissues are such that it might accumulate unduly in the lymphatic spaces, as in the muscles or the serous cavities, there are arrangements for pumping it out of those spaces and driving it into the lymphatics, so that it enters the peripheral extremities under pressure. The conditions which will interfere with the flow of lymph are: want of muscular action; want of inspiratory action of the thorax; diminution of the diastolic suction of the heart, and positive pressure in the veins.

We now come to consider the part taken by the veins in removing lymph from the lymph spaces, and this, as I have already said, appears to be very great, much greater than that of the lymphatics, for when a cannula is placed in a lymphatic vessel the flow, as I have already said, is slow, but if the vein of the district be tied, the flow becomes increased to an extent far more than double what it originally was. The objection may be raised that this great increase is not merely due to the absorption which would usually have taken place from the lymphatic spaces into the veins having been arrested by the ligature, but that it is really due to the exudation of lymph from the capillary blood-vessels into the spaces being greatly increased.

It is, I should think, probable that both of these factors take part in the increase, although it may be rather hard to say precisely how far the increased quantity of lymph which flows from the lymphatic after ligatures of a vein is due to increased transudation or diminished absorption.

There is, however, a point which seems to me to indicate not only that the veins have much reabsorptive power, but that they tend to reabsorb the watery constituents of the lymph, for œdematous lymph contains only from 2 to 3 per cent. of solids, while the lymph which flows from a vessel when the veins are open contains from 4 to 5 per cent. This difference of composition appears to me to point strongly to reabsorption of water from the lymph by the venous radicles, while the solids tend to find their way onwards through the lymphatics.

The flow of blood in the veins, like that of the lymph, depends upon difference of pressure in the peripheral and central ends of the vessels. In the upper part of the body this is aided by gravity, but in the lower parts it is counteracted by gravity. The weight of the longer column of blood in the veins of the body and leg would, to a great extent, prevent the circulation in the veins of the feet were it not aided by muscular action, which presses it onward in much the same way as it does the lymph; and how powerfully muscular action does so has been known for centuries to every barber, who provided his patient with a pole to grasp before letting blood from the arm.

It is aided also to a certain extent by the respiratory action of the thorax and the diastolic relaxation of the heart. In saying "diastolic relaxation" of the heart, I have followed Cohnheim in the recent edition of his *Lectures on General Pathology*, but I am not quite certain that it would not be more correct to say the systole of the heart, because, as Brücke has pointed out, the pericardium may be looked upon as a sort of bell-jar, the walls of which, though elastic, are kept more or less rigidly in position by the apposition of their outer surface to the lungs. Each time that the ventricle contracts and drives the blood into the aorta, it tends to cause a vacuum in the pericardial space, and thus tends to draw the blood from the venæ cavæ into the auricle.

The conditions which interfere with the flow of blood in the veins are then : want of muscular action, want of movement in the thorax, and feeble action of the heart, no matter whether we look upon the systole or diastole as being the active power in sucking the blood onwards from the veins.

More important still as a cause of complete arrest in a vein is pressure upon it from without or plugging within.

We have now considered what we termed at first the two exit pipes of the cistern, the veins and the lymphatics. Not only the two together, but either the one or the other separately, appears in the normal condition to be able to remove the lymph which is poured out into the tissues from the blood-vessels, and thus to prevent any accumulation from taking place.

Dropsy then does not occur except we have increased outflow of lymph into the tissues in addition to an interference with its removal by the veins or lymphatics.

We have now to consider the conditions which affect the supply pipe in the illustration with which we commenced, or, in other words, the conditions which increase and diminish the exudation of lymph from the capillaries into the lymph spaces. The first of these is increased supply of blood from dilatation of the arteries supplying a part.

I have already mentioned that, in Ranvier's experiment of tying the vena cava in a dog, the mere stoppage of the venous circulation does not always produce œdema of the legs, the lymph which is exuded from the capillaries being removed either by collateral venous circulation or by the lymphatics. The case, however, is usually different when, in addition to the ligature of the vena cava, the sciatic nerve is divided on one side. In consequence of the division the vessels dilate, more blood pours into the limb, more lymph is exuded into the tissues, and the limb with a divided nerve swells up enormously, while the other remains of its normal size, although the venous circulation is equally arrested in both. That this accumulation of lymph in the tissues of the leg is due to paralysis of the vasomotor and not of the motor nerve of the limb is proved by dividing on the one side the motor roots of the sciatic and on the other the vasomotor roots. When the sciatic trunk is divided, there is of course both a vasomotor and motor paralysis in the limb, because the vasomotor and motor nerves have been alike divided, and we get the œdema therefore coinciding with the paralysis in the limb; but when we get the motor roots of the sciatic divided and the other intact we no longer get the paralysis and the œdema coinciding. The limb on that side where the motor roots have been divided is paralysed, but, the vasomotor roots being intact, it retains its normal size on the other side; the vasomotor roots being divided while the motor roots are intact, the power of motion is retained, but the limb becomes œdematous. The supply of lymph to the tissues is, therefore, evidently greatly increased by division of the vasomotor nerves and dilatation of the arteries, so that the partially

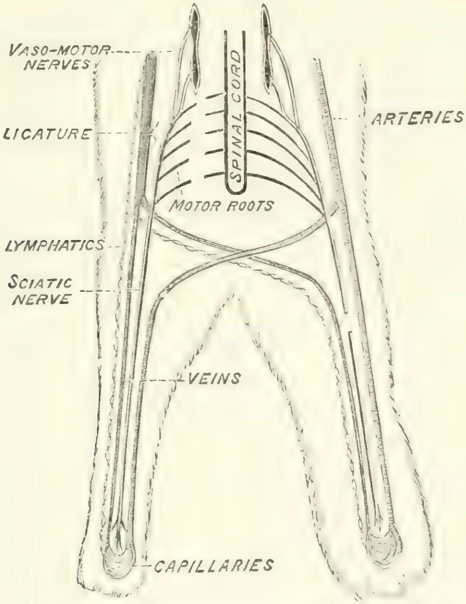

FIG. 5.—Diagram of Ranvier's experiment.

obstructed efferent vessels, veins and lymphatics, can no longer carry the lymph away, and œdema occurs. Sometimes a very slight obstruction is sufficient to produce œdema when there is vasomotor weakness. This one may sometimes observe in one's own hands. Usually we may walk about for a whole day without feeling the least tendency to swelling in the hands, but every now and again, in a hot sultry day, when there appears to be thunder in the air and we feel limp and languid, we may notice that, after walking about for a while with the hands hanging by the side, the fingers swell to a certain extent, and there may be not only difficulty in drawing on one's gloves, but the fingers may be so distinctly swollen as to be slightly stiff in trying to bend them. Here we have not complete vasomotor paralysis, but only paresis from the effect of the atmospheric conditions on the vasomotor nerves, and the consequence is that the exudation of lymph being much increased the slight interference with venous and lymphatic return, caused by the position of the limbs, and aided perhaps by a slight pressure of the clothing, is sufficient to produce œdema.

This, at least, would be the explanation if we were to consider increased exudation of lymph from the blood-vessels as due only to dilatation of the arteries and interference with venous or lymphatic flow. As we shall see shortly, however, there is probably another factor, viz., changes in the capillaries themselves.

As a contrast to the ready production of œdema in the arm by simple dependent position, aided perhaps by a slight constriction of the clothes and by atmospheric influences, we may take the difficulty with which it occurs under certain experimental conditions.

Frequently, as Ranvier has shown, ligature of the vena cava with accompanying section of the vasomotor nerves of a limb will cause great œdema; but this is not always the case. For Cohnheim has observed in dogs, and I have myself found a number of years ago in the cat, that simultaneous ligature of the vena cava and section of the sciatic does not always produce œdema. I was very much struck by this in one experiment which I made, for in it, although the vena cava was tied and the sciatic divided in one leg, I could notice almost no increase in the size of either limb. At the same time, as I have already mentioned, the veins on the surface of the limb where the sciatic had been divided were not much swollen, so that I am inclined to believe that a great part of the lymph effused from the capillaries was removed by the lymphatics.

The readiness with which œdema sometimes occurs with very slight alterations in the circulation, and at other times does not occur although the alterations in the circulation are very great, shows us that there are other factors of very great importance. These factors are the condition of the blood and the state of nutrition of the capillary vessels. It is possible that those two conditions really resolve themselves to a great extent, if not entirely, into one, and the main factor is the condition of the capillary vessels. This must necessarily depend to a considerable extent on the condition of the blood. It would, however, be going too far to exclude the condition of the blood from direct influence on the transudation of lymph and allow it only an indirect action through its effect on the walls of the capillary vessels.

There can, I think, be little doubt that the quality of the blood itself alters the quantity and quality of the lymph exuded, just as differences in the quality of the fluid that you pour upon a filter will affect the quantity and character of the filtrate. But in filtering we find that with many fluids the filter will allow filtration to go on for a length of time, while with others it is speedily choked and allows neither fluid nor solid to pass. In the process of filtration the filter becomes altered, and thus the quantity and quality of the filtrate depend upon the condition of the filter as originally used, upon the quantity and quality of the fluid to be filtered, and also on the changes which the filter undergoes during the process of filtration.

One of the most ordinary forms of dropsy is the slight œdema which we notice in the legs of persons suffering from anæmia. There may be no cardiac disease, the lungs may be quite healthy, there may not be the slightest interference with the flow of blood, either through the lymphatics or veins, and yet we find dropsy occurring in the legs; the lymph passing out in such quantities from the blood-vessels that the veins and lymphatics are unable to remove it. It occurs in the legs and not in the other parts of the body, because in the upright position the circulation in the veins and lymphatics is opposed by gravity. In the production of the œdema here we have probably several factors: there is first the watery condition of the blood; next the condition of nutrition of the capillaries; and in addition we probably have a tendency to vasomotor paresis, for the anæmia lessens the nutrition of the tissues generally, and the vasomotor centre suffers with the rest.

The occurrence of œdema in the hands when hanging by the sides on a sultry day shows us how very slight an interference with the venous circulation may be sufficient to produce œdema under certain conditions. Usually, however, some interference with the venous or lymphatic flow may be noticed, but there is one case in which œdema may be produced without any apparent interference with either the veins or lymphatics. This occurs in the case of the tongue, for Ostroumoff has found that when the lingual nerve is irritated, not only do the vessels of the tongue dilate, but the whole side of the tongue swells up and becomes œdematous. This might be looked upon as proof positive that mere dilatation of the vessels may cause œdema, but such a conclusion would be premature. We must bear in mind that when we irritate a vaso-dilating nerve we not only make the vessels dilate, but we very probably alter their structure for the time being and render exudation from them more easy.

Claude Bernard's beautiful experiments on the submaxillary gland have taught us that, when the chorda tympani is irritated, the arteries going to the submaxillary gland dilate so much that the blood rushes through them, and through the capillaries that connect them with the veins, in a rapid stream, so rapid that if the vein be punctured the blood issuing from it is no longer dark but bright and arterial, and instead of trickling out of the vein in slow drops, it jets from it as if from an artery. When this experiment is performed on a normal animal, at the same time that the artery dilates the secreting cells of the gland begin to form saliva, which pours in a stream from the duct during the continuous irritation of the nerve. The secreting cells do not take the material from which they form the saliva directly from the blood, they receive it indirectly from the lymph spaces which surround the alveoli. Into these spaces the lymph exudes from the blood, and from it as from a reservoir the cells take up the materials they want; indeed these spaces will so far act as a reservoir that we may cause the cells to secrete saliva even after the head has been separated from the body, if we take care to fill the lymph spaces with lymph previously by tying the veins of the gland and rendering it to some extent œdematous before cutting off the head. During the irritation of the chorda tympani, then, the secreting cells of the submaxillary gland take up lymph very rapidly from the lymph spaces which are adjacent to them, and pour it out in the form of saliva. Quickly as they take up the lymph, however, it is still more quickly poured out from the blood-vessels, so that during the continuance of the irritation we not only have a stream of saliva pouring out from the salivary duct, but we have a considerable increase in the amount of lymph which pours out from the cervical lymphatics. This observation, as well as most of the knowledge that we possess in regard to the flow of lymph and the fundamental facts of secretion in general, we owe to Ludwig. In this experiment we have the lymph which exudes from the vessels carried away by two, perhaps three, channels, the secreting cells of the gland, the lymphatics, and probably also, to some extent, the veins. When we obstruct one of those channels by injecting into the salivary gland a solution of

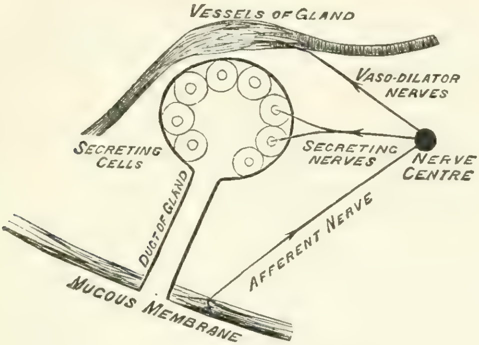

FIG. 6.—Diagram of a salivary gland.

quinine, or dilute hydrochloric acid, more lymph is poured out from the arteries than the lymphatics and veins together can carry away, and the gland becomes œdematous.

A very remarkable change occurs in the results of this experiment when we administer a dose of atropine to the animal. If we irritate the chorda tympani after poisoning by atropia, the vessels dilate as before, the veins become full, and the current of blood in them becomes rapid, but not a drop of saliva is secreted by the cells.

We are usually in the habit of assuming that the chorda tympani contains two sets of fibres, one of which goes to the secreting cells and another to the vessels; the one set stimulates the glands to functional activity, and the other causes the vessels to dilate.

We usually explain the effect of atropine by saying that it paralyses the peripheral ends of the secreting nerves in the cells of the gland; but if this were the only explanation, we ought to have a result very much like what we get on injecting a solution of quinine into the gland. We ought to have the gland either becoming œdematous, or the flow of lymph in the lymphatics passing from the gland should be enormously accelerated; the lymph which exudes from the vessels ought either to be carried away rapidly by the efferent vessels, or should accumulate and produce œdema, but neither of these results occurs. Heidenhein has found that the gland does not become œdematous under these circumstances, and the flow of lymph through the cervical lymphatics is not accelerated. Now I have already mentioned that under normal conditions, even when the gland is forming large quantities of saliva, and thus removing a quantity of the fluid poured out from the vessels, we have an increased flow of lymph occurring during irritation of the chorda tympani nerve. I can see then no other way of explaining the fact that after poisoning by atropine it does not produce either secretion of saliva or increased flow of lymph from the lymphatics, than by assuming that the atropine has so altered the vessels as to prevent the exudation of lymph from them into the lymph spaces at the same time that it has allowed the arteries to dilate. We know that the secreting cells of the gland are still able to form saliva because irritation of the sympathetic nerve will cause secretion even after the power of the chorda tympani to cause secretion has been completely paralysed. I should not be prepared at present to deny that the chorda tympani has fibres which stimulate the secreting cells to increased action.

What I wish to insist upon here is that in all probability atropia has an action upon the vessels of the gland which has hitherto been entirely overlooked ; yet such an action as I have mentioned is one of the greatest practical importance, because if we are able through the action of our drugs to prevent the exudation of lymph from the blood-vessels into the lymph spaces, it will enormously increase our power to prevent or to lessen dropsy.

In a remarkable research upon the action of drugs on the heart and vessels, Dr. Gaskell showed that dilute acids cause relaxation of the muscular substance both of the heart and blood-vessels, while dilute alkalies have an opposite effect, and cause contraction. He showed also that certain drugs resemble acids in their action, while others resemble alkalies. Thus muscarine, the poisonous principle of mushrooms, tends like acids to cause relaxation of the ventricle and dilatation of the blood-vessels, while atropine has an opposite effect, and resembles alkalies in its action.

Dr. Cash and I have repeated Dr. Gaskell's experiments on the effect of acids and alkalies on the vessels. This action is tested by killing a frog and then keeping up the circulation in it artificially, by connecting the aorta with a vessel containing diluted blood or saline solution. As the pressure is constant, the rapidity with which the fluid flows out of the veins affords a measure of the dilatation or contraction of the vessels. We have observed that not only do the vessels dilate under the influence of acids added to the circulating fluid, so that the liquid pours much more readily out of the veins than before, but that the walls of the vessels themselves appear to become much more permeable, so that the tissues tend to become œdematous.

Under the influence of alkalies the vessels contract, the flow of fluid out of the veins becomes scanty, and no œdema is observed in the tissues. This experiment affords, I think, a clue to the changes in the vascular walls which give rise to dropsy, although much research will still be necessary before our knowledge on this subject is either complete or accurate.

In regard to the action of acids and alkalies upon the vessels, however, we may obtain useful information from the effect of experiments on the submaxillary gland. I have already mentioned that atropine, which Gaskell found to act upon the vessels like alkalies, appears to arrest the flow of lymph from the blood-vessels into the lymph spaces, so that the secretion of saliva is entirely arrested, while the flow of lymph through the lymphatics is certainly not increased, nor yet does the gland become œdematous, although the blood-vessels are fully dilated. As I have said, moreover, by injecting a solution of quinine or dilute hydrochloric acid into the duct of the gland, the secretion of saliva is stopped, but here the gland becomes œdematous. These facts seem then to indicate that the acid has increased the tendency to exudation of lymph from the blood-vessels.

I may again shortly recapitulate what we have now gone over, as to the general sources of dropsy, and then proceed to say a few words regarding particular kinds of dropsy.

Shortly, then, dropsy depends on the quantity of lymph effused from the blood-vessels being greater than the veins and lymphatics can carry away. This may depend either upon obstruction to the veins and lymphatics, or excessive exudation from the blood-vessels. The veins and lymphatics in the normal condition are able, however, to carry away so much more fluid than is effused from the capillaries, that, unless the obstruction to them is very great indeed, no œdema occurs so long as the capillaries are in their normal condition.

In almost all cases of dropsy, then, we may consider that the capillaries are so altered as to allow a greater amount of transudation. The exact nature of the alteration we do not at present know; but such experiments as we have on the subject tend to show that acids, or substances having an action upon the vessels similar to that of acids, may have very much to do with this effect.

The forms of dropsy may be divided either according to their supposed causation or to their seat.

From their causation they may be divided into dropsy of passive congestion, hydræmic dropsy, and inflammatory dropsy, according to the tissue on the affection of which the dropsy appears to depend.

These may again be subdivided into cardiac dropsy, hepatic dropsy, anæmic dropsy, renal dropsy, scarlatinal dropsy.

Another class of dropsies are nervous dropsies, and it is perhaps at the present moment rather doubtful how these dropsies are produced, and how far they are dependent on changes in the circulation of blood in the part affected, and how far on alterations in the permeability of the vascular walls.

In dividing dropsies according to their seat we have general œdema, ascites, hydropericardium, pleuritic effusion, hydrocele, and effusion into joints.

In regard to the particular dropsies I shall say only a few words, as, in questions of this sort, if we can settle the general causation of any condition, the application of it to particular instances is easy.

I have mentioned that sometimes, even in health, the mere weight of the column of blood in the arms, and perhaps slight constriction by the clothes on a sultry day, may produce slight œdema in the hands. A similar condition is noticed in the legs in œdema, and it is not unfrequently very marked in cases of fatty heart. Indeed, the occurrence of œdema in the legs when the urine is normal, and no cardiac murmur is to be heard, is, I think, a very important point in the diagnosis of fatty heart.

We find it also markedly in the legs where the venous flow is obstructed in consequence of emphysema or mitral disease. In such cases the effect of the greater pressure of blood in the venous radicals in producing œdema is well shown by its disappearance when the patient has been lying down. That even in such cases, however, the permeability of the capillaries has much to do with the production of œdema is shown by the fact that every now and again we meet with persons who are suffering from great emphysema and excessive interference of the venous circulation, and yet little or no œdema is to be noticed. A sudden change in the condition of the patient, and one too attended by a relief of the general symptoms, may cause œdema to appear.

I was much struck with a case of this sort which I saw a year or two ago. An old woman was suffering from chronic bronchitis with emphysema, the lungs were choked with mucus which she could not expectorate, her face was becoming rapidly more and more livid, she was apparently at the point of death, and yet there was but very slight œdema in the legs. I gave her an emetic of ipecacuan with the effect of greatly relieving her, clearing the lungs, and of removing the lividity, but the day afterwards the œdema in the feet was very well marked. This shows that even in those cases the permeability of the capillaries has much to do with the production of dropsy, although such cases are generally ascribed almost entirely to venous obstruction, and this obstruction has no doubt a great deal to do with their causation.

Another form of œdema is that which occurs in connection with albuminuria—or perhaps it might be better to say, with Cohnheim, in the earlier stages of albuminuria. For Cohnheim divides the dropsies which occur in albuminuria into two classes: the first, which occurs in the earlier stages, is due to changes in the permeability of the vessels, allowing a more rapid exudation of fluid from them. The dropsy which occurs in the later stages, and which affects the serous cavities as well as subcutaneous cellular tissue, he regards as due to passive congestion, secondary to changes in the heart.

The first form, then, of albuminuric dropsy, which affects only the subcutaneous cellular tissue, differs from the dropsy of passive congestion not only by being confined to the subcutaneous tissue, but in affecting different parts of it. In the dropsy of passive congestion the parts which swell are those which are most dependent, such as the feet and legs; but in the dropsy of albuminuria the parts affected are those where the cellular tissue is loose, such as the face. The dropsy of albuminuria is usually ascribed to a more watery condition of the blood, but Cohnheim shows that this alone is not sufficient to produce œdema. So long as the capillaries are in a healthy condition, they do not allow more exudation to take place when the blood is rendered watery by the intravenous injection of a large quantity of dilute saline solution than they do when the blood is in its normal condition. But when the capillaries have become altered by inflammation, which renders them more permeable than usual, the effect of any alteration in the concentration of the blood is at once manifest. The dilute blood, although it does not pass through healthy capillaries more easily than the concentrated blood, exudes through the altered capillaries very much more rapidly than the normal blood, as is shown by the much greater quantity of lymph which is poured out from the vessels of the inflamed limb of a dog, when its blood is diluted by the injection of a large quantity of saline solution into the veins. This experiment shows us that, although alterations in the composition of the blood will not produce œdema when the vessels are healthy, yet, when the vessels are already altered by disease, a diluted condition of the blood tends greatly to increase the œdema; and we thus obtain to some extent an explanation of the good effects of diuretics and purgatives in dropsy.

The ready occurrence of œdema in scarlet fever, and as a consequence of a sudden chill, is ascribed by Cohnheim to increased permeability of the vessels due to inflammatory changes in them. No doubt he is to a great extent right, and the œdema occurs chiefly in consequence of changes in the vessels, but we must try and find out more particularly what the changes are if we are to learn much regarding the rational treatment of œdema. The term *inflammatory* does not help us —at least, does not help us much. We must try and find out whether we can bring the changes in the vessels into direct connection with the action of drugs.

Now one of the most striking forms of dropsy is probably the intense œdema which is said to occur to the natives of the West Coast of Africa, or in Europeans resident in some hot climates in consequence of sudden wetting. This comes on suddenly in the absence of cardiac disease, and in the absence of albuminuria. Now in hot climates the skin secretes much sweat, and this sudden œdema is just what we would expect if stoppage of the functional activity of the sweat glands were to occur without a corresponding arrest of exudation from the vessels. In poisoning by belladonna or atropia, as we have seen, the secretion of saliva is arrested, but the exudation from the vessels of the salivary gland is also diminished. We have no similar experiments regarding the action of atropia upon the vessels of the skin, but probably a similar action occurs in regard to the lymphatics of the skin, as we know that atropia arrests the secretion of sweat in almost exactly the same way as it arrests the secretion of saliva.

In consequence of the diminished exudation from the vessels, we find no œdema occurring in the salivary gland after poisoning by atropia, although the vessels are much dilated, nor do we find any œdema occurring in the skin under similar conditions, even although the cutaneous vessels may be so much dilated that the patient poisoned by atropia presents an erythematous flush all over, like one suffering from scarlet fever. In scarlet fever, also, the secretion from the skin appears to be diminished or arrested, for the skin is dry and has a pungent feeling, which is probably due to the want of cooling evaporation. But at this time there is no œdema. The skin is red, the vessels are fully dilated, the secretion from the sweat glands is probably completely arrested, and yet there is no œdema. But we can readily see that, if the vessels should by any means become readily permeable before the sweat glands had resumed their function, we should at once have all the conditions for acute œdema.

We can readily see, also, that the blood-vessels will be more readily acted upon by any substance which is circulating in the blood than the sweat glands would be, for, in order to act upon the sweat glands, any substance must first pass through the vessels into the lymph spaces adjacent to the sweat glands, and then be taken up by the secreting cells.

If therefore any substance should either be absorbed from the intestinal canal, or be formed in the tissues of a patient suffering from scarlet fever, which will cause permeability of the capillaries without stimulating secretion of the sweat glands, we would expect œdema to occur. Now it would almost appear that certain abnormalities, either in digestion or in tissue change, precede the œdema of scarlet fever and the albuminuria which accompanies it, for here, I think, we must look upon the albuminuria and the œdema, not as dependent upon one another, but as consequences of one common cause, which probably is the presence of something in the blood which acts as a poison upon the tissues already predisposed to its action. Now Dr. Mahomed found what he regards as a pre-albuminuric stage of scarlet fever, in which he noticed a peculiar reaction of the urine, which gave a blue with guaiac. If the patient were left alone when this action was noticed, albuminuria came on, but if a brisk purgative was at once administered, the abnormal condition passed away and no injury resulted.

The œdema of scarlet fever is usually considered as due to some chill, but we do find cases in which the utmost care has been taken, and where we cannot trace any distinct history of a chill, and yet œdema occurs. A chill may, no doubt, not only induce changes in the circulation, but may induce changes in the alimentary canal, and in the tissues generally, by which substances may be formed which, after their absorption into the blood, may increase the permeability of the vessels. But I think, at the same time, we must keep our eyes open to the possibility of such substances being formed even without any exposure.

The phenomena which occur in urticaria are, I think, instructive in regard to the possible causation of dropsy by poisons circulating in the blood, for there we frequently find that after the ingestion of certain articles of diet the skin becomes bright red, the capillaries dilated, and what are really spots of local œdema occur. These may be very limited, or they may be extensive, as in the case of a lady of my acquaintance in whom a single strawberry will produce such an intense urticaria that the face swells up and the eyes become almost closed by the accompanying œdema.

Now in urticaria the round white swellings resembling the effects of the sting of a nettle suggest the idea that they arise from some point in the centre, and it seems not improbable that the originating point is a sweat gland. Both in urticaria and in the sudden œdema occurring after a chill in hot climates, I am inclined to regard the sweat glands as playing an important part, and paralysis of the secreting power as a cause of œdema, not only because the fluid effused from the bloodvessels ceases to be drained away from them, but also because it seems to me not improbable that, although the secretion is not fully elaborated, such changes may occur as will produce acid in the secreting cells. Normally this will be carried away in the sweat, but if retained it may react upon the capillaries in the same way as Cash and I have found in our experiments, and thus increase the amount of fluid poured out from them.

I have preferred in this paper, on the pathology of dropsy, to deal most at length with the particular points which seem to me most likely to lead us to a rational and successful treatment.

Again to recapitulate. Dropsy consists in the accumulation of lymph in small lymph spaces or large serous cavities. The accumulation is caused by more lymph being poured out from the vessels than can be removed by the lymphatics and veins. Obstruction to the lymphatics and veins will rarely produce dropsy unless the quantity exuded from the capillaries is greater than the normal. The exudation from the capillaries is increased by changes which occur in them. These changes are classed generally by Cohnheim under the name of *inflammatory*. This designation is too vague to give us any guide to treatment, and I have tried to point out that the increased permeability of the vessels is probably due to an alteration in them. It may be produced by acids circulating in the blood, as in the experiments of Cash and myself; by acids applied to them from without, as in Ludwig's experiment with the submaxillary gland; or by acids, or poisons which act like acids, absorbed from the intestinal canal, or formed in the tissues themselves.

## APPENDIX.

SINCE I wrote this paper I have become acquainted with some facts which seem to me to support the views regarding the action of acids which I have advanced. Through the kindness of Professor Hans Meyer of Dorpat, I have received an Inaugural Dissertation, written under his direction by Jacob Feitelberg, on the action of various poisons upon the acidity of the blood. In this paper the author shows that a number of poisons have the power of increasing the acidity of the blood. They appear to do this by diminishing oxidation, as it is found that, along with increased acid, which chiefly appears to be sarcolactic acid, the carbolic acid in the blood is lessened. One drug which has this power in a marked degree is arsenic, as we know one of the common symptoms of arsenic poisoning is an œdematous condition of the eyelids. This effect of arsenic on the amount of acid in the blood seems to me to afford a ready explanation of the œdema which it produces.

# Reviews.

*On the Treatment of Wounds and Fractures.* By SAMPSON GAMGEE, F.R.S.E., Consulting Surgeon to the Queen's Hospital, Birmingham. Second Edition, 8vo. London: Churchill. 1883.

THIS is a consolidated edition of the author's clinical lectures, with much additional matter. The principle of the analogy between wounds and fractures in the nature of the lesions, the processes of repair, and the treatment, is enforced; and the author's views and methods of treatment are illustrated by a large number of cases. Rest, immobilisation, and well adjusted pressure are the methods to be relied on in most cases of wounds and fractures. By these swelling and inflammation are prevented, and the processes of repair allowed to go on undisturbed. In wounds all sponging with water is to be avoided; the edges being brought together, dry dressing in the form of lint or absorbent cotton is to be applied and to be seldom changed. Bleeding vessels are to be twisted and styptic colloid used. Fractures are to be reduced at once, and well padded pasteboard with starched bandage, or poro-plastic felt, or plaster of Paris, applied, and the limb suspended. An account is given of Professor Vanzette's method of treatment of inflammation by digital compression of the main artery of the limb, which may in some instances be carried out to a considerable extent by the patient himself. Other subjects are dwelt upon. Thus "ingrowing toe-nail" is treated by gently inserting cotton wool under the edge of the nail, touching the granulations with sulphate of copper, and fixing a pad of lint upon the part by a spiral strip of adhesive plaster. As to trephining in fracture of the skull the author refrains, we are glad to see, in many cases in which the operation would be performed by most surgeons. He does not accept the "germ theory" in its usually received sense; and prefers his dry method of treating wounds to the antiseptic system. The work concludes with directions for the treatment of the several fractures. It contains many thoughtful suggestions and useful practical hints.

*Elements of Histology.* By E. Klein, M.D., F.R.S. Fcap. 8vo, pp. 352. London: Cassell and Co. 1883.

Dr. Klein's book has the merit of being the first successful attempt to give beginners a connected account of the minute structure of the tissues of the body. The excellent descriptions of Schäfer in *Quain's Anatomy* have the disadvantage of being scattered about in a volume largely devoted to gross anatomy; and the ordinary text-books, while containing much detail unnecessary for an elementary student, unfortunately contain not a few serious errors. The many additions which have of late years been made to histology render an adequate account of it no easy task, and we are glad to see that this task has been undertaken by so competent an observer as Dr. Klein. His manual contains a large number of woodcuts; it gives an astonishing amount of information; and on the whole it deserves very high praise. A reviewer, however, seldom finds a book completely as he would wish it, and we should be exceptional if we did not think that in this there were one or two minor points which might be amended in a new edition.

In an elementary book the author must, no doubt, treat the subject in the main dogmatically, but some may think that Dr. Klein has occasionally gone too far in this direction. He may have excellent reasons for believing certain views to be well founded, but as long as other competent observers are of a different opinion, it would surely be better to give such views as probably true, than to state them without reserve. Thus we find without qualification the statements—that the nuclear network of the cell is sometimes connected with the cell-network (p. 7); that cilia are connected with the filaments (network) of the cell-protoplasm (p. 21); that endothelial cells form white blood-corpuscles (p. 29); that the medullary sheath of nerves is made up of rod-like structures (p. 109); that non-medullated nerves have a neurilemma (primitive sheath) like that of medullated nerves (p. 111). All these may no doubt be true, but they are hardly to be taken by the student as quite indisputable. With one or two exceptions (*e.g.* Figs. 78, 120, 123, 132) the figures are excellent, and very well chosen. Here and there, perhaps, the student might wish for an additional figure, as, for instance, in the account of the taste-cells. In the descriptions of the various glands some little confusion may be caused by the statement that cells become more granular during activity; it being left doubtful whether granules are present in the living cells, or produced by the action of reagents (compare pp. 213, 294). The least happy section is, perhaps, that on the endings of motor nerves in striated muscles; the subject we think deserves somewhat fuller treatment, and it is doubtful whether the description given will be greatly helped by the curious figure on page 124.

But even when the fullest deduction has been made for these points the book remains an excellent one, good and judicious both in plan and execution. We are confident that it will be of very great service to all those who are entering on a study of histology, and its very rapid success shows that its value has at once been properly appreciated.

The series of students' manuals to which it belongs promises well, and we shall watch the successive numbers with interest.

*A Manual of Pathology.* By JOSEPH COATS, M.D., Pathologist to the Western Infirmary, &c., Glasgow. 8vo, pp. 902, with 339 illustrations. London: Longmans. 1883.

*Practical Histology and Pathology.* By HENEAGE GIBBES, M.D. 2nd edition. Crown 8vo, pp. 154. London: H. K. Lewis. 1883.

*On the Pathology of Bronchitis, Catarrhal Pneumonia, Tubercle, and allied lesions of the Human Lung.* By D. J. HAMILTON, M.B., Professor of Pathological Anatomy, Aberdeen. 8vo, pp. 248. Illustrated. London: Macmillan. 1883.

*Lehrbuch der speciellen pathologischen Anatomie.* By Dr. JOHANNES ORTH, Prof. der allgemeinen Pathologie, &c. (Göttingen). Part I. 8vo, pp. 281. Illustrated. Berlin: Hirschwald. 1883.

*A History of Tuberculosis, from the Time of Sylvius to the Present Day.* In part a Translation from Dr. ARNOLD SPINA. By ERIC E. SATTLER, M.D. Post 8vo, pp. 191. Cincinnati: Clarke. 1883.

STUDENTS will welcome Dr. Coats's *Manual* as the first indigenous English text-book aiming at completeness in general pathology as well as in pathological anatomy. Like other teachers, he has felt that lectures on the subject gain in interest and intelligibility when the etiology, anatomy, and physiology of disease are all taken into account in the description of each morbid condition, and his book is doubtless a reflex of his lectures in this respect. While, therefore, the general plan of the work follows closely on that of recent German text-books, there is no lack of the fresh detail and personal experience which students find both enlivening and helpful to the memory. The woodcuts are laudably numerous, and generally clear if not always artistic. Authorities are but little alluded to, and scarcely any references are given to the literature of the various subjects. The omission lightens the book for beginners, but materially lessens its usefulness to those who are a little beyond the first stage. We hope that in a future edition, which will no doubt be called for, condensation will be carried somewhat further than in this; the volume will gain in handiness and need not lose a whit in value.

Dr. Heneage Gibbes has worked with so much energy and success at the recent methods of demonstrating pathogenous organisms that his advice on the subject is specially valuable. His handbook is essentially practical, and has been worked out at the laboratory table. How to choose a microscope, how to seal up a preparation-jar, how to cultivate the *Bacillus anthracis*, how to find tubercle-bacilli in the breath of phthisical patients, and a multitude of like points—are all explained with clearness and knowledge. The publication of this second edition, with its useful additions, is highly opportune.

Professor Hamilton, with characteristic independence and courage, has added to his reprint of the original and able papers published in the *Practitioner* (1879-1880) a vigorous protest against what he regards as the "exaggerated and illogical" conclusions now so freely drawn from Koch's important discovery. Against the conclusiveness of Koch's experiments he brings no serious objection, "the only point of dubiety is that tuberculosis can be produced in guinea-pigs and rabbits from so many different causes . . . . . that really one becomes sceptical as to almost any procedure which consists in the insertion of an organic substance into their tissues." It is, perhaps, enough to point out in answer to this now somewhat obsolete objection that while it is possible that the "procedures" alluded to may give rise to nodular or *tubercular* eruptions, the evidence is all against the eruptions being *tuberculous, i.e.* specifically infective, when precautions are taken to exclude morbific germs (*Practitioner*, xxx. 261). Probably for some time to come the mere morbid histologist and the etiological pathologist will fail to see eye to eye in this matter: the term tuberculosis to one implies nothing but certain changes of structure (usually involving some favourite morphological element or other), to the other it is a specific infective disease whose exciting cause is always the same.

The new text-book of Professor Orth is characterised by all the German fulness and exhaustiveness. It is plainly meant for workers and advanced students, and it contains the fullest references and usefully digested abstracts of even the latest memoirs on its subject. The present section contains chapters on the diseases of the blood and lymph, and of the hæmatopoietic and circulatory organs. The illustrations, though somewhat scanty, are fresh and often good. Read in connexion with, and supplementary to, Cohnheim's more dogmatic and discursive lectures, it will give the pathologist all he needs for gauging the present position of pathology in Germany.

Dr. Sattler has freely translated a somewhat meagre brochure of Professor Spina's, and has added two chapters on Koch's work and the antagonistic criticisms by which it has been met. As a history of the subject the book is by no means complete, and it has no other pretensions to usefulness. On the great "war" now being waged between Spina and Koch on the validity of the micro-parasitic theory, Dr. Sattler judiciously refrains from pronouncing an opinion.

*Tables of Materia Medica*, a Companion to the Materia Medica Museum. By T. LAUDER BRUNTON, M.D., F.R.S., &c. New Edition. 8vo, pp. 204. Illustrated. London: Macmillan. 1883.

*Handbuch der gesammten Arzneimittellehre.* By Dr. med. THEODOR HUSEMANN, Professor in Göttingen. 2nd Edition, in two Volumes. Vol. II. 8vo, pp. 517-1243. Berlin: Springer. 1883.

*A Guide to Therapeutics.* By ROBERT FARQUHARSON, M.P., M.D., F.R.C.P. 3rd Edition. Crown 8vo, pp. 373. London: Smith, Elder, and Co. 1883.

*Materia Medica*, a Manual for the Use of Students. By ISAMBARD OWEN, M.D., St. George's Hospital. Fcap. 8vo, pp. 191. London: Churchill. 1883.

*The Extra Pharmacopœia of Unofficial Drugs and Chemical and Pharmaceutical Preparations.* By WILLIAM MARTINDALE, F.C.S., &c. With References to their use by W. WYNN WESTCOTT, M.B., Deputy Coroner for Central Middlesex. Med. 24mo, pp. 313. 6*s*. London: H. K. Lewis. 1883.

*Lectures on Practical Pharmacy.* By BARNARD S. PROCTOR, formerly Lecturer on Pharmacy at the College of Medicine, Newcastle-on-Tyne. 2nd Edition. 8vo, pp. 493. Illustrated. London: Churchill. 1883.

*The Untoward Effects of Drugs.* A Pharmacological and Clinical Manual. By D. L. LEWIN, University of Berlin. 2nd Edition, revised and enlarged. Translated by J. J. MULHERON, M.D., Professor in the Michigan College of Medicine. 8vo, pp. 216. Detroit: Davis. 1883.

THE first four books on our list have already passed through their first editions, and we need therefore do little here but point out wherein the new editions differ from the old.

Dr. Brunton has utilised for the benefit of students the experience he has gained in lecturing for some years to large classes at St. Bartholomew's. In addition to the clear and concise arrangement of the tables of materia medica which does so much to ease the burden on the student's memory, some more positive aids are given—(1) in a list of substances most likely to be confounded; (2) in well-chosen figures of the chief roots, barks, stems, seeds, &c.; (3) in a series of searching and exhaustive questions for self-examination; and (4) in the introduction of the familiar English names of the organic drugs. In a future edition it will doubtless be possible to give the familiar names of all the drugs; it is often of essential importance for the practitioner to know substances in common use by the names they bear in the language of the patient.

The encyclopædic work of Professor Husemann to which we have already referred (*Practitioner*, xxx. 207) is now complete, and the second part excels in thoroughness and comprehensiveness even the very excellent first volume. The effort made to keep the work abreast of the latest advances in pharmacology is apparent in the introduction of notices anent such new comers as kairin and formamide of mercury. The index of subjects we hoped for is given, and is fairly full; an index of authorities would no doubt be a very laborious addition, but we are sure it would often be turned to with gratitude. Professor Husemann may be congratulated on having completed a comprehensive and labour-saving work on a subject whose ramifications are so wide that few can take them all in single-handed.

Dr. Farquharson's Guide is arranged on an admirable plan, and represents in a happy way the spirit of modern medicine. In parallel columns the student finds the physiological actions of each remedy as worked out in the laboratory, and the therapeutic uses as proved by clinical experience. The plan brings out the physiological basis of many old empirical practices, while ever and again it suggests (by implication) therapeutical problems which rational medicine has still to solve. Both to students and to physicians the mere arrangement of the coordinate series of facts must be full of stimulus and suggestion. The third edition has been brought up to date, though there are still a number of somewhat obtrusive misprints. As the author says, some reference at least will be found in it to everything the student can be expected to know about the action of drugs.

Dr. Isambard Owen, with praiseworthy industry and carefulness, has raised his small examination-handbook of pharmacy and materia medica to the position of a very thorough little manual of the *Pharmacopœia*. Every aid of type, arrangement, condensation, and classification, is given to the student who desires to master for a brief period the contents of the official volume; the only fear is that, by the very completeness of the manual, that illusive mastery may be rendered all but impossible. The old edition represented a modicum of knowledge such as many students could fairly assimilate; we fear the new represents an unattainable maximum. An element of science is introduced in the elaborate and generally accurate chemical equations, and the condensed but clear *rationales* which are given in connexion with the pharmaceutical processes.

In the sixteen years which have passed since the first edition of the *Pharmacopœia* was published, a multitude of new remedies have been introduced, and a considerable number of them have been approved by the profession. Pending the preparation of a new edition, Mr. Martindale's handy pocket digest of the unofficial remedies is opportune and convenient, and Dr. Westcott's very full references to the periodicals and other works in which the experience of physicians with regard to the remedies is given add much to its value. We notice, for instance, sodium nitrite inserted on the faith of the articles in the March and May numbers of the *Practitioner;* on cascara sagrada, potassium permanganate, and lily of the valley, we are referred to the very latest volumes of the *British Medical Journal* and of the *Lancet;* and full and valuable notes on the use of the salicyl compounds are given from the best and most recent sources. We have pleasure in recommending so well-executed a piece of work to the notice of all who regard themselves, in the American phrase, as "progressive therapeutists."

Mr. Proctor's lectures have already won a high repute among practical pharmacists for their clearness and scientific spirit. The new edition is in several points an improvement on the old, notably in the very well-weighed and judicious remarks on the directions in which the *Pharmacopœia* may with advantage be amended, and on the most eligible forms from a pharmaceutical point of view in which approved drugs may be prescribed. Though addressed primarily to students of pharmacy, there is much in Mr. Proctor's interesting pages which it behoves prescribers to study and take to heart. Form is already of an importance only second to that of matter in the composition of a successful prescription, and the pharmacist can give many a hint as to form which would never have occurred to the physician. Certain "awful warnings" in the shape of illegible prescriptions are appended in *fac-simile*, and point an obvious moral.

Dr. Lewin's work on *Die Nebenwirkungen der Arzneimittel* is a useful systematically arranged collection of observed effects of drugs other than those for which they are usually prescribed. The subject has interesting bearings on the obscure question of idiosyncrasy and habituation, as well as on the more obvious one of impurity and adulteration in drugs. Dr. Mulheron, with the author's sanction and assistance, has produced a readable and intelligent translation, in which, however, the names of the German Pharmacopœia are retained.

# Clinic of the Month.

**New Operation for Spina Bifida.**—Mr. A. M. Robson, in the *Brit. Med. Journ.*, March 24, 1883, describes the case of a child in whom he performed an operation for spina bifida, when it was only six days old. The infant was fully anæsthetised, and a vertical incision made on each side of the tumour; the integuments were carefully dissected from the meninges until the laminæ of the vertebræ were reached. The redundant membranes were cut away after letting out the fluid, and then several sutures were applied to the serous surfaces of the arachnoid, so as to completely shut off the spinal canal. In the meantime, Mr. Mayo (under the antiseptic spray) had dissected the periosteum from the femur and frontal bone of a rabbit. This periosteum was now placed, with its osteogenic layer undermost, over the closed meninges, and carefully sutured to the periosteum of the laminæ on each side, and to the bony margins above and below. After this the skin was sutured, a layer of protective applied, and a pad of salicylic wool placed over the wound. The whole operation was performed under the eucalyptus air, and the patient made a good recovery, but there was no evidence of new bone having formed over the gap. (*London Med. Record*, July 1883.)

**Subcutaneous Injection of Perosmic Acid.**—M. O. Delbastaille has met with success from the injection of a 1 per cent. solution of perosmic acid in cases of sarcoma, lymphoma, strumous enlarged glands, and also cancerous glands. Three minims daily were employed. This injection had the advantage in a case of lymphoma, that, whilst it caused the shrinking of the tumour, it exerted no effect upon the surrounding textures. (*Centralbl. für die med. Wiss.*, March 31, 1883.)

**The Formamide of Mercury.**—Prof. Zeissl, of the Vienna Hospital, reports that in a trial which he has made of Liebreich's formamide of mercury in fifteen cases of syphilis he has been well satisfied with the results. The pain produced was of shorter duration and less severity than with corrosive sublimate, the region of the buttocks or of the spine being best suited for the injections. In three of the cases salivation was produced. In the obstinate forms of the disease—*e.g.* psoriasis palmaris—many more injections were required than in the lighter forms; but Prof. Zeissl has never had to make more than twenty in order to disperse the various secondary symptoms [*Practitioner*, xxx. 368]. (*Centralblatt für med. Wiss.*, June 9, 1883.)

**Transmission of Anthrax to the Fœtus.**—Dr. E. Perroncito has confirmed the observation already made by Strauss and Chamberland that anthrax (woolsorter's disease) may sometimes be transmitted from the worker to the fœtus *in utero.* Of fifty-three fœtuses which were examined microscopically anthrax bacilli were found in two, once in the umbilical cord and once in the liver. Portions of tissue from 25 were used for cultivation, and in the case of eight the cultivations were successful, genuine bacilli being grown. (*Arch. italiennes de Biologie*, vol. iii.)

**Early Syphilitic Arteritis.**—At a meeting of the Pathological Society of London, held on January 16, 1883, Dr. Sharkey showed microscopical specimens of syphilitic disease of cerebral arteries. These sections were taken from a patient who had died within seven months of the date of infection. Dr. Sharkey expressed the opinion that such early involvement of the vessels in syphilis was not very rare. It is the ordinary belief that lesion of the cerebral arteries is rather a late manifestation of syphilis. In the current numbers of *La France médicale* the clinical history and post-mortem appearances of a case are recorded which, if the interpretation given by M. Geffrier be correct, would afford a fresh proof of the notion that such arterial changes may be of early occurrence. The patient was a man, aged forty-two years, who contracted syphilis in October 1882, and was repeatedly under medical treatment from November till March 1883, when he died. The primary chancre on the lip healed and the roseola disappeared under treatment, but the headache proved obstinate. At the autopsy the basilar artery was found thickened and filled with thrombus; disease also existed at the middle cerebral arteries and in the adjacent portions of the anterior cerebral and posterior communicating branches of the circle of Willis. Histological examination revealed the signs of inflammation in all the coats of the affected arteries, but the distribution and arrangement differed at different parts. Woodcuts illustrating the microscopical details are appended to the paper referred to. Seeing that the patient was repeatedly under medical supervision during the short term of his illness, the reflection is forced upon us whether our present remedies can safely be regarded as sufficient to meet the dangers entailed by the syphilitic lesions of the vascular system. (*Lancet*, July 14, 1883.)

**Operations on the Kidney.**—Quénu (*Archiv. Gén. de Médecine*, December 1882) reviews the one hundred cases collected by Harris, and adds to them two French cases. Of these one hundred and two cases, fifty recovered, forty-six died, and six remained under treatment when reported. Of the ninety-six completed cases, forty-six were operated upon by abdominal incision, with twenty-three recoveries. Fifty were operated upon by the lumbar incision, with twenty-seven recoveries. Quénu concludes from his analysis of the cases that the abdominal incision is to be preferred for large tumours and for displaced or movable kidneys, and that in other cases the lumbar incision is the best. Further, that the lumbar incision should always be used in doubtful cases. Weir reports another case of successful fixation of a movable kidney in the manner suggested and carried out by Hahn (*N. Y. Med. Journal*, February 17, 1883). The kidney was cut down upon in the lumbar region, and its capsule attached to the edges of the wound by catgut sutures. The patient made a good recovery, and the symptoms were much relieved. Whether this method offers a permanent relief is still an open question (*Centralblatt f. Chirurgie*, July 23, 1881). Polk (*N. Y. Med. Journal*, February 17, 1883) reports a case of congenitally displaced kidney in a malformed young woman, without uterus or vagina. The kidney was in the iliac region, and seemed to cause her much pain, especially at the menstrual periods, when it swelled, and was very tender. The hæmorrhage at these periods escaped apparently with the urine. As the patient insisted on an operation to relieve the pain, Dr. Polk removed the kidney by an incision in the iliac region. The peritoneum was not opened. The operation wound healed kindly, but the patient died at the end of eleven days. The autopsy revealed the entire absence of any kidney. That in a case of this sort the abdominal incision would have been of great advantage by revealing the absence of the other kidney is evident to the reflective reader. The diagnosis of the condition of the other kidney when nephrotomy is thought of is of evident importance. If one ureter can be successfully compressed, and the bladder washed out, the urine then collecting while that ureter is still occluded must come from the other, and its examination will reveal the condition of that kidney. A rectal lever similar to those used for controlling the iliac arteries has been tried for this purpose. Dr. Polk suggests the compression of the ureter between the beak of a much curved catheter introduced into the bladder and the fingers in the rectum. It must always, however, be a matter of doubt in a given case whether by either of these methods the ureter is actually controlled. It is an interesting physiological and therapeutical observation that Dr. Polk's patient, under the liberal use of pilocarpine, could survive for eleven days without a vestige of renal secretion. (*Boston Med. and Surg. Journ.*, June 28, 1883.)

**Tumour and Fistula of the Umbilicus.**—Dr. Tillmanns, of Leipzig, reports in the *Deutsche Zeitschr. für Chir.*, vol. xviii., the following case, which he believes to be unique, of congenital prolapse of the gastric mucous membrane through the umbilical ring. The patient was a lad aged 13, who presented just over the navel a tumour about the size of a walnut, and covered by deep red mucous membrane. This growth seemed to be attached to the umbilicus by a very thin pedicle. It was irreducible, and its size remained uninfluenced by coughing or by firm manual pressure over the abdomen. From the mucous surface of this tumour there was a secretion, very abundant on digital examination and after each meal, of a turbid and very viscid fluid having an acid reaction, and possessing the chemical and physiological characters of the secretion of the gastric glands. The epidermis of the skin around the tumour was macerated, and, as it were, digested by the action of this discharge. No visible orifice could be discovered on the surface of the tumour, and there was no history of any portion of fluid food or of fæcal matter having ever been seen there. The tumour was first observed on the separation of the stump of the umbilical cord on the sixth day after birth. The midwife, in tying the cord, noticed that it was unusually thick near its fœtal attachment. The growth increased slowly in size for about nine years, and then remained stationary. Dr. Tillmanns diagnosed this condition as one of irreducible prolapse of gastric mucous membrane, connected with the stomach by a thin and no longer permeable pedicle. Chloroform having been administered to the patient, the tumour was removed by the knife. No bad symptoms followed the operation, and the lad was soon discharged. The diagnosis was confirmed by microscopical examination of the tumour, which was found to be made up of the different coats of the stomach. The central portion was composed of the serous, subserous, and muscular layers, whilst the outer covering was formed by the mucous and submucous layers. The form of the abundant glandular elements indicated that this prolapse had taken place from the pyloric extremity of the stomach. This, Dr. Tillmanns states, had evidently been a case of congenital umbilical rupture containing a gastric diverticulum, a portion of which had been constricted by the ligature applied by the midwife to the umbilical cord, and had thus been cut off, leaving an exposed mucous surface. The pedicle, it is supposed, had been gradually reduced to a very thin cord by the pressure of the margins of the umbilical ring. Dr. Tillmanns has failed to find any report of an analogous case. In all other cases that have been recorded of prolapse of mucous membrane through the umbilical ring, the protruded part had been derived either from the small intestine or from a patent urachus. This paper concludes with an interesting analysis of recorded cases of such pathological conditions of the umbilicus as are due to persistence of the vitello-intestinal duct and of the urachus. (*London Med. Record*, June 1883.)

**Chian Turpentine in Cancer.**—Currie speaks favourably of Chian turpentine, which he has used in one case of duodenal cancer, and in several cases of cancer of the uterus. In only one case was the effect negative, and then it was doubtful if the patient took the medicine regularly. In all the other cases it gave marked relief from pain, while the cachexia disappeared and the general health improved. No effect on the progress of the cancer was observed, the effect of the drug being mainly anodyne. (*Edin. Med. Journ.*, May 1883.)

**Localised Atrophy of the Brain after Amputation.**—The Academy of Medicine at its last meeting listened to a very interesting paper and report of a case by M. Bourdon, in which there was a local atrophy of the cerebral structures after amputation, this being the seventh example which this observer had collected. In a previous memoir on the subject M. Bourdon had demonstrated that the amputation of a member causes atrophy of the upper portion of the cortical layer of the convolution in the motor region, as a result of the loss of functional activity. The present illustration shows that this degeneration may extend also to the central portions of the cerebrum, and secondarily as far as the medulla oblongata. In this case an amputation performed forty years before, in which the arm was removed, had caused a paralysis of the leg on the same side. This remarkable result, it is seen, was a remote one, and only appeared towards the end of the patient's life. The autopsy showed an atrophy of the cells and some of the nervous fibres which preside over movements of the leg, an atrophy which apparently had been very slowly and gradually established.

The case was that of an old soldier, who had submitted forty years before to a disarticulation of the left arm, and who died suddenly with cerebral congestion. Up to this time he had never experienced any cerebral disorder; but during the last years of his life the lower extremity on the same side as the amputated arm was gradually becoming paralysed. At the examination of the brain, on the right side there was noticed a decided depression of the ascending frontal convolution. This was also observed in the paracentral lobule and the convexity of the right hemisphere. The lateral ventricle of the same side was considerably enlarged, especially at the level of the affected convolution, denoting a very extensive atrophy of the subjacent white substance. The corpus striatum also presented a depression near its centre, and the optic thalamus was flattened. Sections of the medulla oblongata showed that the median raphe was deviated to the right, and very markedly atrophied. Upon carefully weighing the hemispheres, the right was found to be thirty-one grammes less than the left. (*Revue de Thérapeutique,* June 11, 1883.)

**Oil of Wintergreen in Rheumatism.**—At the New York Medical and Surgical Society, Dr. Flint stated that the results of the trial made of this substance in thirteen cases at Bellevue Hospital served to show rather better results than those which are ordinarily obtained from salicylic acid. The oil of wintergreen was administered several times a day in ten-drop doses in flax-seed tea, which renders it less disagreeable to the taste and to the stomach. In some of the cases the alkaline treatment was employed at the same time. Dr. Ball stated that Dr. Kinnicutt had used the oil of gaultheria in a number of cases of acute rheumatism with even better results than those mentioned by Dr. Flint. It was administered in milk, and was less disagreeable when so taken than salicylic acid or salicylate of sodium. [*Practitioner,* xxx. 49.] (*New York Med. Journ.,* June 30, 1883.)

**Dysentery and Hepatic Abscess.**—In a paper on the relation of hepatic abscess to dysentery, Sir J. Fayrer summarises his opinions as follows: (1) The so-called abscesses which originate in local necroses of parenchymatous organs are cavities varying in size from a mere speck to that of an orange, containing detritus, sanies, puriform matter, leucocytes, and pus. They are seen in various stages of development, and are not necessarily confined to the liver, but occur in other viscera or regions of the body: these are truly pyæmic. (2) There is a form of liver abscess coexistent with, and perhaps due to, dysentery, which is the result of direct absorption and transference of pus or septic matter from the bowel to the liver through the mesenteric veins: such may be solitary, double, or triple. This is also a very dangerous form of the disease, though not necessarily fatal, as it is feared must always be the case in the former variety. (3) Dysentery, malarial fever, and hepatitis may coexist, or supervene on each other as effects of a common climatic cause; it seems natural to ascribe the liver abscess in such cases to the dysentery, but it is probable that they are rather coincidences than consequences one of the other, and that the cause which affects the glandular structures of the large intestine may determine the mischief in the liver in certain climates and localities: such cases are obviously very different from those previously mentioned. (4) The ordinary large (and most frequently single) tropical abscess is quite independent of dysentery, though it may coexist with or follow it. Each or all of these forms may, in England, be the result of disease originally contracted in certain climates. (*Lancet*, May 19, 1883.)

**Puerperal Diabetes.**—Dr. J. Matthews Duncan has written a valuable paper on this rare affection. In it he gives histories relating to twenty-two pregnancies in fifteen women, varying in age from twenty-one to thirty-eight. So far as is known, all (with one exception) were multiparæ. Of the twenty-two pregnancies in fifteen mothers four ended fatally after delivery. Hydramnios was frequent, and the liquor amnii in one case contained 0·7 per cent. of sugar, and in a second case there was also unquestionably sugar in the liquor amnii, although no quantitative examination was made. In seven of nineteen pregnancies in fourteen mothers, the child died during the pregnancy, having in all of these reached a viable age. In two more the child was feeble, and died a few hours after birth. In one other case the child had diabetes. The dead fœtus was very large in many of the cases. Dr. Duncan admits that the number of cases which he has been able to find is too small to possess any very great statistical value, but the histories seem to show that (1) diabetes may come on during pregnancy; (2) diabetes may occur only during pregnancy, being absent at other times; (3) diabetes may cease with the termination of pregnancy, recurring some time afterwards; (4) diabetes may come on soon after parturition; (5) diabetes may not return in a pregnancy occurring after its cure; (6) pregnancy may occur during diabetes; (7) pregnancy and parturition may be apparently unaffected in its healthy progress by diabetes; (8) pregnancy is very liable to be interrupted in its course, and probably always by the death of the fœtus. (*Trans. Obstet. Soc.*, vol. xxiv.)

**Irritation of the Vagus by enlarged Bronchial Glands.**—Dr. Edward T. Bruen discusses the effects of enlargement of the bronchial glands in producing reflex irritation of the pneumogastric nerve. The difficulty in the diagnosis of such cases consists in separating them from cases of early phthisis. One must rely mainly on the absence of the combination of physical signs required to render the presence of incipient phthisis certain. These are impaired percussion resonance, some form of bronchial breathing, possibly fine moist râles, and increased vocal resonance. The last two physical signs are not present in cases of bronchial enlargement. Pain in the back and disturbance of the respiratory rhythm are not often present in phthisis. Hysteria and uterine or spinal disorder may be eliminated by careful examination. Finally, the beneficial results of treatment may be appealed to to sustain the theory of the etiology of the cases. (*American Journal of the Medical Sciences*, July 1883.)

**Tetany.**—At the meeting of the Medical Society of Vienna on May 25, Dr. N. Weiss communicated some interesting facts bearing on the nature of tetany. He had collected from German literature thirteen cases of tetany which had followed the operation for extirpation of a bronchocele. From the table which had been drawn up it appeared that tetany had only been met with in cases of young women on whom total extirpation of the enlarged thyroid had been practised; that the nervous affection came on not later than ten days after the operation; that only eight of the cases showed signs of damage to the recurrent laryngeal nerve; and finally, that five cases got well, seven died (two as a certain result of the tetany), and the remaining one still suffered from tetany three years after the operation. In three cases, in which Dr. Weiss had the opportunity of performing a post-mortem examination, changes were detected in the grey matter of the anterior cornua of the cervical enlargement of the cord, and chiefly at the level of the fifth and sixth cervical nerves. The alterations observed were, briefly, swelling of the ganglion-cells, with lateral displacement of the nuclei, vacuolation of the cells, atrophy, and shrinking of the protoplasm and cell processes. In the discussion which followed, Professor Billroth contrasted and compared the characters of tetanus with those of tetany: he regarded the anatomical changes found microscopically in the grey matter of the cervical region of the spinal cord in tetany as probably of the nature of a direct continuation of the nutritional disturbance from the site of the operation. The proximity of the brain and spinal cord was an important factor, and it was not improbable that the neural changes occurred in all cases of removal of goitre, but it was suggested that they had to reach a certain degree of intensity before they could give rise to tetany. Professor Rosenthal remarked that vacuolation could be by no means characteristic of tetany, seeing that vacuoles were described in connexion with many nervous diseases. (*Wiener med. Woch.*, 22, 1883; *Med. Times and Gaz.*)

# Extracts from British and Foreign Journals.

**Small Doses.**—Dr. Thorowgood writes:—From such experience as has fallen to my own lot, I have come to the conviction that the doses of many medicines as set forth in books are often needlessly large, when we seek, not an eliminant or evacuant effect, but a gradual alterative or specific action from the remedy. There is probably no medicine regarding the definite action of which physicians agree better than iron; but is it necessary for the cure of facial neuralgia to give an insoluble powder like the hydrated oxide of iron in a dose ranging from thirty grains up to three or four drachms? The subnitrate of bismuth, another insoluble powder, has been given for the relief of gastric pain in such large doses that, after death, large, hard, black masses of concrete subnitrate and sulphide of bismuth have been found blocking the intestinal canal. The gentleman who made the post-mortem said the masses he removed looked like lumps of metal. *Corpora non agunt nisi soluta*, say some. If this be accepted as a principle, what can be expected but painful intestinal obstruction as a result of perseverance in the administration of large doses of insoluble substances? Calomel and other preparations of mercury have, given in repeated small doses, in my experience proved valuable in the treatment of peritonitis, pleurisy, and pericarditis, but I have never once salivated a patient. Some years ago I saw a lady lying with knees drawn up in bed, rapid small pulse, black tongue, and incessant vomiting. She had been confined about five days previously, and was taking repeated doses of opium. I advised in this case the withdrawal of the opium and the administration of one-third of a grain of calomel every two hours. Under this treatment the vomiting ceased and convalescence set in, though when the treatment was commenced her condition was so critical that an experienced man who was in attendance said to me: "Give what you please. I do not think anything can save her." The British Pharmacopœia gives the dose of tincture of aconite as from five to fifteen minims, but I am sure I have seen better results from a dose of one or two minims every two hours in commencing inflammation than I have seen from the larger doses. I have had house-physicians who have started at once by giving five-minim doses of tincture of aconite, and they have told me they had tried aconite in the case, but it did not suit, as faintness came on after a few doses. My advice has been, "Try next time with two minims instead of five." I know of no drug so generally useful in the treatment of asthma as arsenic, and could give, from fifteen years' experience, a great many cases of spasmodic asthma that have seemed to me to get quite well under the influence of small doses of arsenic. I have never exceeded the dose of three minims of either Fowler's solution or of liquor sodæ arseniatis three times in the day, and have never seen any symptoms of arsenical poisoning, except in one case where a very susceptible gentleman finds that one minim of the liquor sodæ arseniatis taken twice daily for a week brings on inflammation of the eyes and pains in the stomach. Twice within this present year I have had brought to my notice examples of the sudden development of very unpleasant symptoms in persons who were taking five-minim doses of liquor arsenicalis three times daily. (*Med. Times and Gaz.*, June 30, 1883.)

**Carbolic Oil in Midwifery.**—Recently, in the *Centralblatt für Gynäkologie*, there has been a series of articles on the doubtful antiseptic properties of greasy preparations of carbolic acid. Dr. Fehling of Stuttgart (March 10th) points out the extreme importance of having a trustworthy antiseptic for obstetrical purposes, and that, since the investigations of Koch in connexion with disinfection (*Mittheilungen des kaiserlichen Gesundheitsamts*, 1881), many have entirely given up the use of carbolic oil. Koch showed that both the spores and bacilli of splenic fever were not in the least degree affected by three months' exposure to carbolic oil, but that it was very different with watery solutions. The investigations also of Wolffhügel and Knorre have shown that water, in contact with carbolic oil, becomes disinfectant because it absorbs some carbolic acid from the oil, but only about a quarter of the amount which oil is capable of taking up from carbolic water. It is thus shown that carbolic oil, coming in contact with the secretions of the body, acts by giving off a portion of the acid to the watery part of them, and that in this way, also, a damp finger may be protected by it. Dr. Haussmann of Berlin (7th April) thinks it impossible to get reliable oily or fatty solutions of carbolic acid, owing to the variability of their solvent powers. Dr. A. Schücking of Pyrmont (28th April) points out the fact that Lemaire, who introduced carbolic acid into medicine, in his work *De l'Acide Phénique*, published in 1863, made the observation that "The disinfecting power of carbolic acid is quite annulled by the addition of oil." Another objection which may be urged against greasy preparations is, that they are difficult to wash away from the skin and nails, and, when frequent examinations of different individuals are made in a limited time, there is some danger of their becoming vehicles for the conveyance of septic matter from one patient to another. It would thus seem that a watery solution of carbolic acid, or one readily soluble in water, is that in which most trust could be placed. Messrs. J. Richardson & Co., Leicester, manufacture a jelly composed of potass soap and glycerine containing 5 per cent. of carbolic acid. This preparation, mixed with a little water, makes a very good lubricating and antiseptic agent. (*Glasgow Med. Journ.*, July 1883.)

**Gelatine Test for Organisms in Water.**—Dr. Angus Smith, of Manchester, has recently brought forward this new test for the detection of organisms in water. It consists in rendering the water thick by dissolving gelatine in it. If pure, the gelatine cylinder remains long unaltered; but if the water be impure from the presence of organisms, the gelatine round the organisms becomes liquefied and globular, the organisms remaining solid at the bottom of the spheres. Dr. Angus Smith has prepared photographs of test-tubes of water which had been thickened by a solution of the purest fish-gelatine, and then exposed to the action of light. When the water was pure, it remained translucent; but when bad, bubbles were rapidly formed, and the bacteria which appeared to be in the water began to act on the gelatine, breaking it up and rendering it soluble. A rapid movement of gas was observable. When the bubbles or balls appeared to be spherical, they indicated aggregations of bacteria. This change took place quickly—almost in twenty-four hours. But a peculiarity of the test was this: that it was only applicable where infusoria or fungi were present. For instance, peaty water in which there were no animalcules or bacteria would stand without breaking up the gelatine. In order to change the gelatine organisms must be present. Organic matter that is not putrescent or infective will not do it. (*Med. Times and Gaz.*, May 26, 1883.)

**Treatment of Premature Baldness.**—Dr. Lassar writes to the following effect on the etiology and treatment of early baldness, or alopecia prematura. From observation and experiment upon animals it was found that the disease is contagious, and occurs independently of any general affection or the state of health of the patient. The method of treatment recommended is as follows: The scalp is to be washed every day with tar soap, or soft glycerine soap, or with soap containing sodium iodide; the soap is to be thoroughly applied, and rubbed into the scalp for fifteen minutes. Following this, a warm douche is used; then after the application of a corrosive sublimate solution (two parts in one thousand) the hair is dried, and a half per cent. spirit solution of naphthalin is rubbed into the affected parts. Carbolic or salicylic acid may also be employed. If this treatment be adopted in the early stage, when the hair is just beginning to fall, it usually proves successful, but it must be kept up for eight weeks or more. The fact that this disease is due to a communicable morbid principle suggests that it may be conveyed by the comb and brush of the barber. (*Berliner klin. Wochenschrift*, April 16, 1883.)

**Experimental Researches on Alcoholism.**—Some fresh experimental investigations on the effects of chronic alcoholism in pigs have recently been made by MM. Dujardin-Beaumetz and Audigé. The conclusions at which they arrived were communicated to a recent meeting of the Académie des Sciences. Alcohols administered in a slow and continuous manner were found to give rise to various disorders. Vomiting of biliary matter and of glairy mucus, together with more or less severe diarrhœa, sometimes with sanguineous stools, were observed. Difficulty of breathing, muscular tremor, and even paresis of the hinder extremities were also recorded. Examination after death revealed congestive changes of the alimentary canal and of the liver, but no hepatic cirrhosis. Well-marked hyperæmia of the lungs and atheroma of the large vessels, especially of the aorta, were also detected. It was remarked that, without hindering the formation of fat, there was a tendency to the appearance of hæmorrhages into the cellular and muscular tissues. These extravasations were even sufficient to prevent the sale of the pork. Absinthe, when given to the animals, gave rise to great excitement, with muscular contracture and cutaneous hyperæsthesia. Great stress is laid on the circumstance that, the more impure the alcohols were, the more marked were the clinical and anatomical signs detected. Unrectified spirit caused marked morbid changes, whilst ethylic alcohol rectified ten times induced but few alterations. It was thus that two pigs at the end of three years succumbed to the ingestion of indifferent specimens of alcohol, whilst other animals of the same species treated with the better forms of spirit appeared to resist intoxication. We regret that further particulars are not given in the report from which we cull this abstract. (*Lancet*, June 30, 1883.)

**The Use of Anæsthetics during Labour.**—Dr. Savill indicates what he believes to be the main precautions to be observed if we would render the use of chloroform perfectly justifiable. (1) There are certain women who have a tendency to flood at every confinement, and others in whom there seems an already too great relaxation of fibre—weak anæmic females in their eighth or tenth confinement; and to these it would be unadvisable to give chloroform, except on necessity. Happily, it is not these women who suffer the most pain, but rather those strong healthy primiparæ whose pelves and general build approximate to the masculine type. (2) We should not give it when labour is complicated with severe vomiting, or with acute heart or lung disease, unless there be imperative call for it. (3) It should not be given to the full extent, except for operation, convulsions, or spasm of the cervix; and then it is most necessary that one person should devote his entire attention to it. (4) The inhalation should be stopped directly we find the pulse becoming very weak, or the respiration irregular. (5) Anything which makes us suspect a fatty or enfeebled cardiac wall should make us cautious in the use of chloroform. Here, as in cases other than those of labour, it is not the most extensive valvular disease (so long as it be attended by compensating hypertrophy), but the atrophied or degenerate wall, that constitutes the source of danger. Unfortunately, the signs of these conditions are subtle and uncertain. Fatty heart may be suspected where there is an exceedingly feeble cardiac impulse, combined with an almost inaudible first sound; or attacks of dyspnœa, vertigo, and syncope, in the absence of anæmia, or valvular lesion; or the copious deposit of fat in other parts of the body, and the occurrence of dropsy without adequate cause. A dilated heart may be suspected if there is increased area of præcordial dulness, combined with epigastric and venous pulsation, and a want of correspondence between the violence of the cardiac impulse and the strength of the pulse. Pericardial adhesions also form a great source of danger. They may be suspected when the heart's apex is fixed above its normal position, and does not shift with respiration; or when there is depression instead of protrusion of intercostal spaces over the position of the apex, giving a wavy character to the cardiac impulse. (6) In all cases, we should take extra care to prevent the occurrence of hæmorrhage after birth—by giving a full dose of ergot when the head reaches the perineum; by stopping the chloroform immediately it is born; and by rousing the patient from her lethargy as soon as possible. (*British Medical Journal*, May 12, 1883.)

**Naphthol in Hyperidrosis and Bromidrosis.**—Kaposi states that in hyperidrosis of the palms and soles and of the axillæ he has often succeeded in giving immediate relief by the use of naphthol. His formula is—

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| Naphthol . . . | 5 | grammes. |
| Alcohol . . . | 100 | „ |
| Glycerine . . . | 10 | „ |

The application is made once or twice daily, and each time the skin is well powdered either with simple flour or starch containing 2 per cent. of naphthol. (*Wien. med. Wochensch.* No. 31, 1882.)

**Treatment of Lupus Erythematosus.**—Dr. Fox of New York has found the following application useful in four cases of lupus erythematosus:

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| Chrysarobin . . . | 15 parts. |
| Salicylic acid . . . | 10 ,, |
| Calamine . . . | 5 ,, |
| Ether . . . | 10 ,, |
| Flexible collodion . . | 50 ,, |

To be painted on the diseased patches. (*Journal of Cutaneous and Venereal Diseases,* No. 5, Vol. I.)

**Cystitis in Women.**—Professor Küstner, of Jena, communicates a paper to the *Deutsche med. Wochensch.*, May 16, 1883, on the prophylaxis and treatment of cystitis in women. He considers that a great many cases of cystitis are caused by the transfer of septic material by means of the catheter from the vulva into the urethra, and strongly urges that on this account catheterisation should never be carried out by the touch only, but always with the aid of sight. It should also be made a rule to have the vulva carefully cleansed before the catheter is used. The next important point is to have a perfectly clean instrument; and Professor Küstner considers that impossible with the form generally used. Even when a brush is used to clean it, and it is boiled in water and disinfected with carbolic solution, a surprising amount of material—more or less septic—may be found adhering close to the eye, which the brush cannot reach even when the extremity of the catheter is perforated. Kustner recommends the use of a simple straight glass tube, of the size of an ordinary catheter; the opening which is to be introduced into the bladder being bevelled, so as to make it as large as possible. The curve in the usual female catheter does not correspond to the course of the urethra, which has been found—by vertical sections in the dead body—to be straight, or at the most very slightly S-shaped, never C-shaped, so that the straight tube is quite suitable. Such catheters have been used for months in Professor Küstner's clinic, and no case of vesical catarrh has occurred since their introduction, although some patients after severe operations have been catheterised from twenty to forty times. The bevelled end is ground very smooth indeed, and the slightest chip in the edge should be the sign that a new instrument must be immediately procured. In the treatment of vesical catarrh, the local—the washing out of the bladder—is the best, except in the so-called rheumatic catarrh. The ordinary instruments used for this purpose—whether a double-current catheter, or a T-tube with indiarubber tubing attached—are not sufficient for thorough irrigation and the removal of lumps of mucus, &c. Küstner recommends a glass tube like his catheter, with a funnel at one end, into which a hollow stopper—communicating with the tube of the irrigator—fits, through which the fluid passes. When the bladder is full the stopper is removed, and the fluid escapes; and this may be repeated until one or two litres have passed through the bladder. Küstner used to employ weak carbolic solutions for irrigation; but he now uses only sublimate solution (1 in 5,000), and does not give more than two washings in a day. He has cured severe cases of septic cystitis in two weeks. The funnel and stopper are figured full size in the paper. (*Lond. Med. Rec.*, July 1883.)

**The Bacillus of Typhoid Fever.**—The alleged discovery of the bacillus of typhoid fever made during the year 1881 by Klebs and Eberth, independently one of the other, although at first received with incredulity, has been since confirmed by several observers so far as is possible in the absence of *the crucial test*, viz., the production of the disease by inoculation with the pure and cultivated bacillus, for as yet no disease among the lower animals has been identified with human typhoid. W. Mayer (*Untersuchungen über die Bacillen des Abdominaltyphus*, Berlin, 1882) demonstrated its presence in the intestinal mucous membrane, the spleen, and the lymphatic glands in eighteen out of twenty-four fatal cases of typhoid; Koch (*Mittheilungen des Reichsgesundheitsamtes*, Band i.) found it in half of the cases examined by him. Klebs met with bacilli or micrococci in twenty-four cases; and Wernich (*Studien und Erfahrungen über den Typhus abdominalis; Zeitschrift für klin. Med.*, Band iv. und v.) concludes from his own researches, compared with those of others, "that the essential phenomena of the course of the disease and the most serious symptoms depend primarily on the numbers of the bacilli or on repeated invasions of the digestive organs by them." The subsidence of special symptoms on the eleventh to the fifteenth day corresponds with the dying off of the nests of bacilli, after which time, unless there has been a fresh invasion, it is often impossible to prove the presence of the bacilli. According to Eberth (*Die Typhusbacillen und die intestinale Injection* in *Volkmann's Sammlung klin. Vorträge*, No. 226), the number of the bacilli is greatest about the twelfth day of the disease, after which it steadily declines to the end of the third week; only exceptionally are they found up to the fifth and sixth weeks. Eberth found them always most abundantly in the lymphatic glands of the cæcum. In this part they appeared as masses of micrococci; in others, where they were less densely packed, they could be recognised as short plump rods, with rounded ends, forming in the fluids of the lymphatic glands chains of two or three links. Unlike the bacilli of putrefaction, they displayed in prepared sections a very small power of absorbing aniline colours. In twenty-four other cases of suppurative processes in the intestine, not of a typhoid character, among which were twelve of tubercle, only once could the existence of such bacilli be detected. Eberth believes that the mucous membrane of the intestine is the regular path of access of the typhoid bacillus into the human body, "whence the fungus makes its way to the mesenteric glands, and passes from them into the circulation, to accumulate finally in the spleen." (*Lond. Med. Rec.*, July 1883.)

**The Action of Remedies on the Cerebral Cortex.**—Albertoni, in vol. xv. of the *Archiv für experimentelle Pathologie und Pharmacologie*, has published the results of a research on the action of medicaments affecting the cortical centres. He has pursued a novel method. Referring to the experiments of Hitzig and Fritsche, of Ferrier, of Nothnagel, and others, who had by electrical excitation mapped out certain motor areas in the cerebral cortex, Albertoni proposed to himself to utilise this method for ascertaining the effects of remedies on the cerebrum. It has been ascertained that on feeble electrical excitation of certain convolutions, muscular movements follow, and that more decided stimulation will induce attacks of a distinctly epileptiform character. Hughlings Jackson had previously shown that irritation of the cortex by a "coarse lesion" caused epileptic seizures. Albertoni proposed to excite, in a similar way, epileptic attacks in animals, and ascertain the effects of remedies in preventing them or diminishing their violence, if any drugs possess such powers. The research was carried on in Schmiedeberg's laboratory at Strasburg, and the drugs tried were bromide of potassium, atropine, and cinchonidine.

The general belief in the value of the bromides as remedies for epileptic and epileptiform seizures is confirmed by Albertoni's experiments. He found that bromide of potassium possesses in a marked degree the power of allaying the excitability of the brain, and this effect is the more conspicuous the longer the remedy has been administered and the more decidedly the system is affected by it. Indeed, a condition of the brain is ultimately attained in which no amount of electrical excitation will induce convulsions.

As might have been *a priori* expected, atropine did not exhibit similar properties. It seems to increase rather than lessen the excitability of the cerebrum. It had no power to affect the results of electrical excitation, and did not lessen the action of the weakest current sufficient to induce movements. This result also corresponds with the clinical experience of the medical profession—for belladonna has not proved useful in epilepsy, although Trousseau rated it comparatively highly in the days before the bromides were introduced. (*Philad. Med. News*, June 30, 1883.)

**Salicylic Acid as a Remedy for Corns.**—Dr. Traill Green speaks highly of the results obtained in the treatment of hard and soft corns with salicylic acid. He has adopted a formula recommended by Mr. Gezou, which is as follows:—

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| ℞ | Salicylic acid . . . | 30 parts. |
| | Ext. of cannabis indica . | 5 parts. |
| | Collodion . . . . | 240 parts. |

The collodion fixes the acid to the part, and protects it from friction; the cannabis indica acts as an anodyne, and the acid reduces and loosens the corn so that it comes off in four or five days. The remedy is applied with a camel's hair pencil, and if the corn is not well cured, the application may be repeated. In four or five days the patient should use a warm foot-bath and rub off the collodion. If any portion of the corn remains, the acid should be applied again and the treatment continued until the whole of the corn has disappeared. (*Medical and Surgical Reporter*, and *Pharmaceutical Journal*, April 28, 1883.)

**Precautions against Cholera.**—M. Pasteur having been requested to lay before the public the instructions he had given to the members of the scientific mission sent to Egypt to investigate the nature of the cholera now raging in that country, has generously complied. He prefaced his instructions by remarking that the precautions thereinafter enumerated related to those cases where the causes of contagion were found to prevail in their maximum intensity. These precautions, he added, are instituted under the hypothesis (which he considers very probable if not certain) that cholera does not enter the human organism by the air passages, but that it does so only by the digestive canal, except under very exceptional circumstances. His advice is:—(1) Not to make use of the drinking water of the locality in which the mission happens to be located without having previously boiled the water, and shaken it well after it has become cold for two or three minutes, in a bottle half filled; or the water may be put into vessels previously heated, *vases flamblés*,—that is to say, vessels that had been subjected to air heated to about 150° C. or even more, the higher the temperature the better. The natural mineral waters may be employed with advantage instead. (2) To make use of wine that has been heated in bottles to from 55° to 60° C.; the wine should be drunk in glasses also previously heated. (3) To make use of alimentary substances only after being well cooked, and fruits in their natural state, but previously washed with water that has been boiled and preserved in the same vessels in which it was boiled, or transferred into other vessels previously heated. (4) To make use of bread cut up into thin slices and submitted to a temperature of about 150° C. during twenty minutes or more. (5) All the vessels employed for alimentary purposes should also be previously subjected to a temperature of 150° C. or more. The bed-linen and towels should be plunged into boiling water, and then dried. (7) The water for washing or bathing should be previously boiled, and, after being cooled, mixed with solutions of thymol or of carbolic acid, the former in the proportion of 1 to 500 parts, and the latter 1 to 50 parts. (8) The hands and face should be washed frequently during the day with boiled water, to which should be added solutions of thymol and carbolic acid. (9) It is only in cases where the bodies of patients who have died from cholera or their soiled linen has to be handled that it would be necessary to cover the mouth and nostrils with a small mask formed of two pieces of thin plates of metal, inclosing between them a little cotton-wool of not more than one centimetre thick, the mask having been submitted to 150° C. only, and submitted to the temperature of 150° on each fresh exposure to contagion. (*Lancet*, Aug. 11, 1883.)

**Bromide of Sodium.**—Dr. Field, Professor of Therapeutics at Dartmouth College, writes to the *Boston Medical Journal*, May 10, stating that, although the employment of bromide of sodium has of late increased, he does not believe the profession sufficiently appreciates its superiority over other bromides. Long and attentive observation has convinced him—(1) That bromide of sodium, being a sodium compound, is less disturbing to the system, rendering bromism less probable and less persistent. (2) It is less depressing on the heart's action under continuous use. (3) It is less offensive to the taste, and much less irritating to the stomach. Foul tongue, fœtid breath, and deranged digestion are less common and less extreme under its continued use. (4) It possesses equal therapeutical power, or rather superior power, from the greater mildness of its action, and because it can be employed when the potassium salt would be inconvenient or impossible. It is pre-eminently the child's bromide, owing to its less disagreeable taste; and for children two years old the food may be seasoned with it instead of with salt—a few grains being added to the bottle of milk several times a day or at bedtime; or, again, from two to four grains may be given in a teaspoonful of water, sweetened or not, which with the potassium salt would be impossible. For nausea and vomiting in the adult, and especially in nervous females, whether occasioned by derangement of the stomach or reflected disturbance, one of the most effective remedies is half a drachm of the bromide to half a tumbler of iced water. This must be drunk slowly as the stomach will bear it, and a little ice must be kept in the solution until it is all taken. The bromide of potassium could not be taken in this way any more than it could in sea-sickness, in which the sodium salt is so useful. Dr. Field cannot state from his own experience whether the bromide of sodium has equal power with the potassium salt in grave neuroses, such as epilepsy. There is, however, much affirmative evidence. But for the many conditions met with in general practice there can be no doubt as to its superiority—for example, as a simple hypnotic and general sedative in various nervous conditions, as an antispasmodic in mild chorea, etc. (*Med. Times and Gaz.*)

**Lesions of Peripheral Nerve-Trunks.**—Dr. Weir Mitchell contributes another of his instructive papers on these nerve-lesions, illustrated by five recent cases, which he has very carefully noted and studied. Nothing which we know as yet explains all the clinical phenomena of these interesting cases, and, in all probability, some of the variations in the symptoms observed are to be attributed to differences in the character of the disorder affecting the nerve-trunks, or even to the nature of the causes originating the active pathological condition. In one of the cases, among various other points of interest, none exceeds in value the abrupt extension of the areas of lessened sensation which was seen after section of the median and radial nerves. This was not to be accounted for upon any knowledge which we now have of the peripheral distribution of nerves, since in one case the dysæsthesia spread far beyond the region tributary to the nerve stretched or cut; and, in the other, in some directions did not cover the whole regions usually affected after radial nerve sections. Generally speaking the symptom is to be considered as one of the many forms of shock. A sudden injury to a nerve already morbidly altered gives rise to an inhibition of function in certain closely related centres. The disturbance might be in the direction of motor or of sensory inhibition, and both forms are among the rarer phenomena of nerve wounds from rifle balls. The fact itself is less surprising than its permanence, nor is it easy to comprehend the precise nature of an influence which may act on such varied functions, and act so persistently. In a case of section of the infra-orbital nerve for facial neuralgia, the remarkable feature was the fall of temperature, a symptom exceptionally rare in any form of neuritis, whether of internal or traumatic origin. (*American Journal of the Medical Sciences*, July 1883.)

**The Venom of Serpents.**—In a preliminary report on the venoms of serpents, in the *Philadelphia Med. News* of April 28th, Drs. S. Weir Mitchell and E. T. Reichert announce that they have made a remarkable discovery in the toxicology of this subject. They have investigated the venoms of all the American serpents, and their study has resulted in the isolation of three distinct proteid bodies. The fact that one of these proteids remains uncoagulated by boiling and will dialyse renders it certain, they state, that it belongs to the peculiar class of bodies which are ordinarily the result of peptic or tryptic digestion, and are known as peptones. This peptone not only gives certain reactions which are so novel as to give it distinguishing characters from all other bodies of its class, but, what is much stranger, it is the only peptone as yet known to constitute a portion of a secretion, or to originate within the living body in any way except as a product of the digestion of proteids. Up to this date all observers have regarded the venoms as representing a single poison. Drs. Mitchell and Reichert, however, have been able to show that the venom of the *Moccasin* and *Crotalus adamanteus* contains three proteids—one analogous to peptones and a putrefacient; one akin to globulins and a much more fatal poison, probably attacking the respiratory centres, and destroying the power of the blood to clot; and a third resembling the albumens and probably innocent. Finally, we have learned that the poisons of the rattlesnake (*C. adamanteus*), copper-head (*Ankistrodon contortrix*), and moccasin (*Toxicophis piscivorus*), are capable of being destroyed by bromine, iodine, bromohydric acid (33 per cent.), sodium hydrate, potassium hydrate, and, as Lacerda and others have shown, by potassium permanganate. In the previous number of the same journal (April 21) the value of iodine administered internally as an antidote for snake bite is borne out by the report of two cases successfully treated by this drug by Dr. George H. Carpenter. (*Dublin Journ. Med. Science*, Aug. 1883.)

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# Department of Public Health.

## ICE AS A VEHICLE OF DISEASE.

In a recent number the subject of ice as a channel by which disease may be communicated to households was somewhat fully discussed.[1] A further contribution to the subject is contained in the Fifth Annual Report of the Connecticut State Board of Health, in which an article by Dr. C. W. Chamberlain, Secretary to the Board, supplies the most recent information which is available on this question. Indeed, nearly all the information we possess as to the influence of impure ice comes to us from the United States, where ice is so freely used both as an adjunct to water and ordinary beverages and also to supply deficiencies in public water services, that it has become one of the leading industries of the country to comply with the demand thus created, and the "ice crop" is regarded as important as that of many of the food supplies. Dr. Chamberlain has been engaged both in examining specimens of ice-water from ice as supplied to customers of the ice merchants, and in making certain experiments as to the influence of freezing in eliminating or destroying organic matters contained in water.

Inorganic pollutions are found to be to a considerable extent removed during the process of crystalisation which accompanies freezing, and this is especially the case with mineral salts. But in the case of organic pollutions the reverse is true, as has already been shown by the experiments of the Committee of the National Board of Health. As regards waters which have been contaminated with sewage, it would appear that such portions of the sewage as are lighter than the heavier water below the film of forming ice float to the surface and become entangled in the ice, and Dr. Chamberlain found that in specimens taken from a highly-polluted stream near a sewer outfall there were several grains more of organic residue from the ice than from the water of the river itself, whereas lower down the stream, where subsidence, oxidation, &c., had had time to come into operation, the ice and the water both contained much the same amount of organic matter. The chemical changes which would under ordinary circumstances tend to reduce the amount of sewage contamination in the water is, however, much less in winter than in summer, and the same applies to the purifying influence of vegetation ; it is, therefore, probable that at the time when ice is formed, the polluted ponds and rivers, at times resorted to, contain more sewage pollution in a given bulk than they would do in summer weather ; and Dr. Chamberlain hence urges that if a stream or pond be unfit as a source of drinking-water in the warmer months, it would be still more unsuitable for the purposes of ice supply in the colder weather.

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[1] See vol. xxxi. No. I. p. 72, "Channels for conveying Infection to Households: how they may be recognised and dealt with," by Dr. Thorne Thorne.

We now know that the infection of the specific diseases is not destroyed by freezing, and that fluids containing specific organisms have, when frozen, been capable of producing definite disease,[1] but we have hitherto had no record of the communication of any specific fever to man through the medium of ice. We would therefore quote, much in Dr. Chamberlain's own words, an account of an instance which he gives, and which, after a very careful analysis of the facts, and an attempt to eliminate every source of error, he believes to be a case in which the enteric-fever poison was so conveyed. A fatal case of this disease occurred in the person of a gentleman who for some months had been living alone, his family having been absent during the summer and the early autumn. All the sanitary arrangements of his house were regarded as perfect, and the cause of the attack was for a long time a mystery. The fact that he was inordinately fond of ice-water led, however, to the suspicion that the infection might have been communicated through the medium of ice, and an investigation as to this followed. The ice used was cut from a pond near the houses of some labourers on the gentleman's farm, and whereas it was the usual practice in the case of such cottages to allow the house drains to empty on to some piece of open ground situated at a lower level, or into some ditch or other similar receptacle, it appears that, unknown to the owner, some of the drains from these dwellings had been connected with the pond in question. During the summer there had been in these very houses three cases of enteric fever, one of which had terminated fatally. And not only so, but the dejections had been thrown, without disinfection, into water-closets, the contents of which passed into the pond. Under the special circumstances the infection conveyed was limited to one individual, because he alone partook of the ice from the polluted pond, and the mere fact that a solitary attack resulted was a necessary consequence of the circumstances, as detailed. Dr. Chamberlain fully satisfied himself as to the accuracy of the facts, but he adds, that if the suspected ice had been used by more persons than one the proof of its being the channel for conveying the contagium of enteric fever would have been more satisfactory.

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[1] See vol. xxxi. No. I. p. 75.

## SANITATION IN PARIS AND LONDON.

In a recent number of the *Revue d'Hygiene* an account is given by Dr. E. Vallin of some of the experiences of the Commission which was sent from Paris after the termination of the serious epidemic of typhoid fever there, to learn something of the sanitary progress and administration in our own metropolis, and the comparisons which are drawn between Paris and London are not only interesting but instructive.

Dr. Vallin deals first with the water-supply of London. He compares its numerous sources of varying quality and under the control of different bodies to the great work by which Belgrand brought into Paris what amounts to a river of excellent water having its sources in the plains of Champagne, and though this was accomplished at a cost which to some seemed to savour of folly, yet the labour once completed the cost came to an end; whereas in London the provision of a water-service involves never-ceasing efforts and a constant expense. In many respects he agrees with the majority of Londoners in regarding the greater part of our water-supply as eminently unsatisfactory in its source, but he is more than astonished to find the want of care that is bestowed upon it after it is once drawn from the Thames, and he explains how he found at Battersea large uncovered reservoirs close to dusty streets and to depôts of house refuse and filth, which material, during the process of sorting, aided in coating the water with a film of dust. But Dr. Vallin is loud in his admiration of the domestic uses to which we put our water. Everywhere, in every house, service-taps were to be found, an arrangement by which personal cleanliness and comfort are largely insured, whereas in Paris there are no less than 30,000 houses to which no water is delivered. This difference he at first believed to be due to the fact that the water-supply of London was more abundant that of Paris, but on inquiry he found that the amount of water consumed in Paris actually exceeded that delivered in London. But whereas in London 78 per cent. of the water is used in private houses, and only 22 per cent. by public bodies, the reverse is the case in Paris, where 75 per cent. is employed in the public service and only 25 per cent is delivered to private consumers. Indeed, in Paris the water is squandered away in washing the public thoroughfares and in supplying public fountains, whilst some of the tenants can hardly procure enough for their most urgent wants. The result is that, whereas, in London, water-closets and bath-rooms are amply supplied, and both individual and household cleanliness are insured, in Paris the reverse is widely the case, and the water-closets especially are in many houses in a state which Dr. Vallin describes as intolerable. But on the other hand, it is very certain that if we in London are lavish with our water indoors, we are far too parsimonious with it in its application to public purposes. Many of our streets need much more frequent cleansing with water than they receive, and in point of water-supply and constant flushing, our public urinals are often little short of a standing disgrace.

Dr. Vallin pays us a high compliment in his description of our modern buildings for the accommodation of the working classes, and he is specially struck with their sanitary arrangements. He describes the water-supply, the closet accommodation, the means of drainage with its system of through ventilation, and the consequent freedom from nuisance with which these dwellings are provided, and he holds them up for imitation in these important respects, especially comparing the cleanly and simple closet-pan and its siphon-trap with the filthy form of closet so often met with in the houses of the middle and lower classes in Paris. The contrast between the two is well known, but we fear that on this point more credit is given to us than we deserve. The arrangements so well and minutely described by Dr. Vallin do, we are glad to say, exist in many of the more recently erected blocks of model dwellings, as well as in the homes of some of the better classes, but both in the houses of the rich and of the poor within the metropolis, closets and drains may be found which produce ever recurring nuisance, and are a standing source of danger to health. So also the arrangement which is described in the *Revue d'Hygiene*, and by which foul air from the sewer is prevented from entering the house drains, whereas the latter are constantly swept by a current of fresh air, is unfortunately by no means general with us. In the metropolis, indeed, it is more rarely carried out than in many a provincial town.

Dr. Vallin professes that as the result of their visit to London the French Commission learned in what respects the two capitals differed from each other; they found many arrangements here which were much superior to their own, but in other respects it appeared to them that we were less advanced than the Parisians. Dr. Vallin and his colleagues intend to profit by the experience gained, and we too should do well if we avail ourselves of the comparisons which he draws between the two cities to learn in what respects our sanitary arrangements are defective.

# ON THE INTERPRETATION OF THE RESULTS OF THE CHEMICAL ANALYSIS OF DRINKING-WATER.

(*Continued from p.* 160.)

In some other experiments recorded in Dr. Cory's report, samples of water polluted with considerable quantities of organic matter were submitted to analysis by the ammonia method. The results are such as to show, from the sanitary point of view, that this process unquestionably fulfilled its purpose of revealing the quality of a water, for these give evidence of excessive pollution by nitrogenous organic matter, upon which such waters could not very well fail to escape condemnation as unfit for domestic use. It is noted, however, that the amount of albuminoid yielded in the process is small relatively to the extent of pollution, and from this circumstance Dr. Cory concludes that, "when the polluting material is in large absolute quantities a given difference in the extent of pollution is not indicated by a corresponding difference in the yield of albuminoid ammonia." This is especially the case with one analysis which is given of a sample to which typhoid dejections had been added in the proportion of 135·1 grain to a gallon. Such a water is little else than sewage, and in the analytical table is described as very turbid in appearance, brownish in colour, with much deposit, and yielding a brownish residue on evaporation. But this amount of albuminoid ammonia is stated to have been only ·0287 grains (·41 per million) per gallon. As a measure of defilement, this is an excessive quantity, and consequently there was even on this occasion no risk of such a sample escaping condemnation as dangerous. When, however, something more is required, and a precise determination of the relative proportions of nitrogenous organic matter in different samples is attempted, certain conditions of experiment have to be observed. The peculiar feature claimed for the ammonia process is that, from the delicacy of the method, small quantities of organic matter are operated upon. In the case of actual sewage, for example, its authors specifically enjoin that an aliquot part of the sample should be taken and diluted with pure distilled water to the required volume for analysis. And so with other highly nitrogenous bodies the character of which, if unknown, is tested by a preliminary examination.

An experiment is recorded in which the samples of unpolluted and polluted water were simultaneously sent for examination to Dr. Frankland and Mr. Wanklyn, and the results furnished by the combustion and ammonia processes in the hands of these well-known exponents are contrasted side by side. To the polluted water a filtrate from diluted typhoid discharges, equivalent to the soluble portion of 3·5 grains and containing 0·21 grains of solid matter had been added per gallon. The resulting determination of the nitrogenous constituents were:—

| | Natural water. | | Polluted water. | |
|---|---|---|---|---|
| | Frankland. | Wanklyn. | Frankland. | Wanklyn. |
| Organic nitrogen . . . | ·0371 | — | ·0399 | — |
| Albuminoid ammonia . | — | ·0056 | — | ·007 |

An increase of ·0028 grains per gallon of organic nitrogen and of ·0014 grains (·02 parts per million) of albuminoid ammonia constitute, therefore, the chemical evidence of such pollution. When it is borne in mind that the ·0028 grains obtained by the combustion process represent the whole amount of nitrogen present in the small quantity of actual solid matter operated upon, and that the ammonia process, which claims only to evolve a proportional amount of the total nitrogen as ammonia, has in this instance yielded nearly one half of the total nitrogen in this form, it must I think be conceded that, apart for the moment from any question of arbitrary value assigned to these indications, the test has demonstrated the capabilities of both methods for the detection of minute quantities of organic impurity.

Brief reference is made by Dr. Cory to the value of potassic permanganate, as applied to the estimation of organic matter in water, and he rightly attaches slight importance to the results obtained by its use. First suggested by Forchhammer in 1850, and variously modified by later experimenters, this process was at one time pretty generally employed.[1]

But it has two serious drawbacks; first, the process in itself does not necessarily indicate even the presence of organic impurity; and secondly, under any circumstances cannot distinguish between non-nitrogenous and nitrogenous organic matter. It has indeed been supposed to proclaim the presence of putrescent matters, but even allowing this to be true, its evidence would not help us very far in judging of the harmful qualities of water. The statement made by some of the advocates of this process, that organic matters of vegetable origin are less easily oxidised than those of animal origin, is wholly unsupported by convincing evidence. What the permanganate process really accomplishes is to indicate to a partial extent the presence of oxidisable matter, which in the absence of reducing agents such as hydrogen sulphide, nitrites, and ferrous salts, is of organic origin. To this extent and with the above limitations the permanganate test is a useful auxiliary to the other methods of water analysis.

I have already made reference to the mineral products of the decomposition and oxidation of organic nitrogenous impurities in water, and the importance of the evidence afforded by their presence of previous contamination.

The determination of the nitrites and nitrates in the series of polluted samples submitted to Dr. Dupré, was made by what is known as the indigo carmin (sodium sulphindigotate) process. This process has the advantage of rapidity and facility of performance, and in the absence of organic matter gives accurate results. But when these are also present the results are below the truth. This interference by organic matter with the accuracy of the test has been noticed by Fischer,[2] and also by R. Warington.[3] Dr. Cory remarks upon the gradual diminution of the amount of nitric acid indicated by the test in a series of artificially prepared waters, to which increasing quantities of blood serum and albumin were added. In one instance, where potassium nitrate equivalent to ·378 grains of nitric acid had been added per gallon, the amount actually found was only ·06 grains per gallon. This was not the case with Frankland's method, by which almost the exact amount of known nitrate was found.

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[1] Miller, *Chem. Soc. Journal* (1865), xviii. p. 117; Angus Smith, *Chemical News*, Sep. 1869, p. 112.

[2] *Journ. Pract. Chemie* [2], vii. 57.

[3] "On the Determination of Nitric Acid by means of Indigo, with Special Reference to Water Analysis," *Transac. Chem. Soc.* (1879), 35, p. 578.

In the latter elegant and accurate method, a modification of Crum's, the nitrogen existing as nitrite and nitrate is evolved as nitric oxide, and the resulting gas measured. Other more accurate processes than the indigo process are the late Ernest Chapman's modification of Schulze's, by which the nitric acid is converted into ammonia in an alkaline solution by means of aluminium, and the ammonia subsequently estimated by the Nessler test, Thorpe's reduction of the acid to ammonia, by Gladstone and Tribe's copper-zinc couple, and that recently described by Warington.[1]

The full significance of this evidence of past pollution as furnished by the mineral products of oxidation in relation to the actual history of a water as regards organic contamination is subject to misconstruction unless the conditions affecting even these more stable constituents are clearly understood. I have, therefore, the less hesitation, as descriptive of the views which are now held by leading chemists on this subject, in quoting Dr. Frankland, himself one of the very highest authorities:—

"As the result of long experience in connection with the occurrence of nitrates, nitrites, and ammonia in potable waters, I am of opinion that the presence of nitrogen in these forms in water in quantity above that which can be derived from rain, is reasonably safe and trustworthy evidence of the previous pollution of that water by animal matters.

"On the other hand it must not be forgotten that the absence of nitrogen in these forms is not absolutely conclusive evidence of immunity from such pollution. There are several agencies at work, by which this testimony as to the amount of animal matter previously in the water may be weakened or altogether destroyed. Thus, we may look in vain for the full evidence of previous animal pollution in the effluent water from fields irrigated with sewage, because the growing plants have removed a considerable proportion of ammonia, nitrates, and nitrites from the liquid as it flows among their rootlets. In like manner the aquatic vegetation of rivers, lakes, and reservoirs slowly removes these compounds from water, and to that extent destroys the evidence of anterior animal contamination. Nitrates and nitrites are also rapidly destroyed when the organic matter in the water containing them enters into putrefaction—a condition which often occurs in streams or reservoirs containing much polluting organic matter. It again not unfrequently takes place in water-bearing strata far removed from the surface although the water in this case may contain but a comparatively small amount of organic matter. The latter, however, cut off from a supply of atmospheric oxygen—as in the chalk beneath the London clay, for instance, accomplishes its oxidation at the expense of the nitrates or nitrites, and thus destroys them. Owing to this cause, the evidence of previous animal contamination is not met with in the water of some deep wells in which it might otherwise be expected to occur. The previous animal contamination of water as deduced from chemical analysis must, therefore, always be regarded as a minimum quantity—it does not denote the *comparative* freedom of different samples of water from anterior pollution, but wherever analysis shows this excess of nitrogen in the shape of nitrites, nitrates and ammonia the water stands convicted of previous contamination at least to an extent so indicated."[1]

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[1] "Note on the Estimation of Nitric Acid in Potable Waters," by E. T. Chapman (1868), *Journ. Chem. Soc.* xxi. 172. "On a Method of Estimating Nitric, Chloric, and Iodic Acids," by T. E. Thorpe (1873), *ibid.* xxvi. 541. "An Inquiry into the Action of the Copper-Zinc Couple on Alkaline Oxy-Salts," by J. H. Gladstone and A. Tribe (1878), *ibid.* xxxiii. 139. "On the Action of the Copper-Zinc Couple upon Nitrates and the Estimation of Nitric Acid in Water Analysis," by M. W. Williams, *ibid.* (1881), xxxix. 100. "On the Determination of Nitric Acid as Nitric Oxide by means of its Reactions with Ferrous Salts," by R. Warington (1882), *Trans. Chem. Soc.* xli. 345.

It must now, I think, be evident from what has so far been said, that if the problem submitted to the chemist were the mere *detection* of the organic constituents of water or of the mineral compounds into which, by oxidation, they are dissolved, his methods could scarcely fail to succeed. By the combustion process of Frankland and Armstrong quantities so minute as half a millionth of a gramme of carbon and one millionth of a gramme of nitrogen are even measurable quantities.

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[1] "On Some Points in the Analysis of Potable Waters," by E. Frankland, F.R.S. (1876), *Journ. Chem. Soc.* xxix. 825. "On the Spontaneous Oxidation of Organic Matter in Water," by E. Frankland, F.R.S. (1880), *ibid.* xxxvii. 517.

By the Nessler reaction quantities of ammonia still more numerically minute may be determined, and Chapman's process claims to estimate ·00004 grammes of nitric acid. And as regards nitrites, Griess's test with metaphenylenediamine enables one part of nitrogen in ten million volumes of water to be easily shown. This remarkably delicate reaction is, however, surpassed by his later test in which, naphthylamine being employed, one part still remains visible in 1,000,000,000 parts of water.[1] So that if the common organic impurity of water were in itself poisonous, methods such as these would unquestionably afford evidence of the presence of quantities so small as, in the case of mineral poisons, to be far beyond those limits to which any deleterious influence upon health could possibly be assigned.

But the parallelism ends here. Aided by the previous observations of the physiologist, the chemist can attach an absolute value to the quantity of one or another kind of mineral impurity, and state with certainty from his laboratory the character of a water submitted to his investigation. To the organic impurity, on the other hand, there may, on occasion, be attached a conception of mischief to which his most refined methods of research furnish not even the remotest clue. This is the conception of *quality* as something not correlative with and wholly independent of *weight*, and which chemistry as a science of quantitative relations must necessarily fail to recognise. And a quality of this kind is that which is inherent in matter not simply organic but organised and living. When purely chemical evidence fails, the germ theory of infective disease, the truth of which it would now be mere affectation of scepticism to question, steps in and supplies the proof.

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[1] "Note on the Appearance of Nitrous Acid during the Evaporation of Water," by R. Warington, *Trans. Chem. Soc.* xxxix. 232. The author recommends this test to be applied in this way, viz. :—To the water in a test-tube are added successively a drop of dilute sulphuric or hydrochloric acid, a drop of nearly saturated solution of sulphanilic acid and a drop of a saturated solution of hydro-chloride of naphthylamine. The nitrous acid forms with the sulphanilic acid a diazo-compound, which is changed by naphthylamine into a body of a rose or ruby colour

The chemist can undoubtedly within wide limits pass a judgment upon the purity, in the sense of safety, of a drinking-water. From water

> "Muddy, ill-seeming, thick, bereft of beauty,
> And while it is so none so dry or thirsty
> Will deign to touch or sip one drop of it,"

through many grades of less obvious contamination, indications of excessive presence of animal impurity are available by his methods of analysis. But it is where the actual amount of such impurity is small, perhaps as small as it may be possible to find in any natural water, where, too, under conditions that have already been discussed this impurity and the products of its oxidation may have fallen within amounts to which quantitatively no appreciable import can be assigned, that difficulty is encountered.

It may be asked: Is this conception of a dangerous specific effect from water of the latter degree of contamination in harmony with observed fact?

We need not go further for an illustration than the Caterham enteric outbreak, to which reference has already been made, wherein the specific infection of the public supply by the discharges from a single individual represented a degree of possible pollution compared with which Dr. Cory's experiment with water contaminated to the extent of 3·5 grains of typhoid discharge to the gallon was a huge and gross pollution.

Yet in the latter instance the measurable quantity of organic nitrogen was ·0028 grains, and of albuminoid ammonia only ·0014 grains (·02 per million) per gallon. It is true that in this experiment what had been added was a filtrate from typhoid matters, but as regards the probability of filtration holding back or removing infective particles, conclusive evidence is at hand.

In the well-known enteric outbreak at Lausen, near Basel, in August 1872, the specifically tainted water supply of the village, from the neighbouring Fürlerthal, where the primary mischief occurred, had undergone natural filtration in its subterranean passage through the intervening moraine gravel ridge of the Stockhalden. This filtration was effective enough to remove every trace of some two tons and a half of flour, which mingled with water were subsequently by way of experiment poured into the stream at the point of entrance of the fever poison. Some idea of the magnitude of such particles may be formed from Prof. Tyndall's beautiful test, in which a few drops of a dilute alcoholic solution of gum mastic being stirred up in a large volume of water, the latter, even after filtration through forty layers of the finest filtering paper, reacted upon light and displayed an azure blue colour. The particles of mastic which had thus eluded the filters, but notwithstanding remained still collectively visible to the eye, proved ultra-microscopic under a power of 1,200 diameters.[1]

Now a classification of natural waters as to quality and safety according to the degree of organic contamination, must, to be based upon sound principles, take cognizance of such possibilities of mischief as those which have here been indicated. Can this be done? A negative answer must be given. Whether the evidence of organic pollution has been yielded by the delicate reaction of the ammonia process, or by the ultimate analysis of the combustion method, its interpretation is a matter beyond the province of the laboratory. Indispensable as chemical results must continue to be in aiding the judgment, a final verdict upon the wholesomeness of a sample of water must be reserved until the physical surroundings and other circumstances affecting its source have been rigidly explored. Thus far, as Dr. Buchanan puts it in his report, "the chemist can tell us of impurity and hazard, but not of purity and safety." In this view of the question, from a chemical as well as from a medical standpoint, I entirely concur.

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[1] *Essays on the Floating Matter of the Air in Relation to Putrefaction and Infection*, 1881, 77.

THE PRACTITIONER.

OCTOBER, 1883.

## Original Communications.

# SPIRITUS ETHERIS NITROSI.

BY D. J. LEECH, M.D.,

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SPIRIT of nitrous ether has been administered as a medicine for several hundred years. A preparation of it was given medicinally as early as the thirteenth century, and since the fifteenth century, when Basil Valentine introduced an improved method of preparing it, sweet spirit of nitre has been very largely used. In England especially it has been much employed, and though at the present time it seems to be held in less repute than formerly by the profession, its use as a domestic remedy under the name of "sweet spirit of nitre" is common throughout the land. But if we turn to what has been written concerning the physiological action and therapeutic uses of this drug, we find the information given to be but scanty. Dr. Garrod calls it a stimulant diuretic and refrigerant, and states that it increases the water whilst diminishing the solids of the urine. Some French authorities, as Trousseau, Pidoux, and Rabuteau following Flourens, classify it with the anæsthetics, whilst Dr. Richardson denies that it possesses any anæsthetic power. Wood, after pointing out that it may produce poisonous effects, says that in ordinary doses it exerts no marked effects beyond increasing the action of the kidneys and skin, but he considers it may act on the nervous system in the same manner as antispasmodics do. Dr. Ringer apparently thinks it is a drug unworthy of consideration, as he does not even mention it; and many share his seeming doubt as to its power as a therapeutic agent. Some experiments, however, which I have recently made with the pharmaceutical preparation, lead me to believe that its physiological effects are by no means slight, and that a knowledge of them may lead us to a better comprehension of the uses and true value of the drug.

Spirit of nitrous ether, even in ordinary doses, is a distinct depressor of arterial tension. Its properties depend of course on the nitrous ether it contains, and these properties are like to those which nitrite of amyl, nitro-glycerine, and the nitrites of the alkaline metals have been shown to possess; but, contrary to what might have been expected, the influence of the drug upon the circulation in moderate doses is of considerable duration.

The fact that nitrite of ethyl is capable of influencing the circulatory organs in the same manner as nitrite of amyl was first pointed out by Dr. Richardson in 1867, though Hermestadt had previously noticed that it affected the head and the circulation. Richardson found that in man it caused a sense of fulness in the head, rapid action of the heart, and suffusion of the skin, just as nitrite of amyl does, and that, like this latter drug, it causes the blood to become of a chocolate colour. Dr. Hay, in his recent papers in the *Practitioner*, "On the Value of some Nitric, Nitrous, and Nitro Compounds in Angina Pectoris," confirms Dr. Richardson's statements. He proves that nitrite of ethyl further resembles nitrite of amyl and the other nitrites, in its power of averting anginal attacks, but he states that twenty minims of nitrite of ethyl produced on himself no perceptible effect, and that given to a patient with angina it also failed to produce any effect on the ailment till sixty or seventy minims had been taken: then it acted like nitrite of soda.

Dr. Hay's experience would lead one to think that but little effect on the circulation could be expected from the "spiritus etheris nitrosi," for the pharmacopœial preparation when pure contains only from three to four per cent. of nitrite of ethyl.

A dose of two drachms would therefore contain about three and a-half to five minims of the ether.[1] I find, however, that if 100 minims of spiritus etheris nitrosi be given to a healthy subject, the sphygmographic pulse-tracing invariably indicates a marked fall in arterial tension, and that this decreased tension lasts for two or three hours. I find, too, that smaller doses of sweet spirit of nitre, such as fifty or twenty-five minims, produce a similar influence on the circulation, though it is less marked and less enduring. Increased frequency of beat always accompanies the fall in tension, and the percussion wave in the tracing is heightened.

The following tracings show the results of 100 minims of spiritus etheris nitrosi, on V. C., a man aged 30, somewhat debilitated, but with sound organs.

The spirit used was obtained from Messrs. Woolley, Sons, and Co., and was found to be free from impurities, and to answer to the pharmacopœial test of strength, that it threw up two per cent. of an ether when treated with saturated solution of chloride of calcium. It contained but little aldehyde.

It will be noticed that one and a-half minutes after the spirit was taken its effect on the pulse was hardly perceptible, but that in three minutes it was marked, and in eight minutes the tension was very low. In thirty minutes a slight rise occurred, and this gradually became more distinct for some time. Rather more than an hour after the ingestion of the drug a fall in tension occurred—this is well seen in the tracing taken at eighty minutes. After this, succeeding pulse-tracings showed a gradual rise, but in three and three-quarter hours the pulse had hardly reached to its normal tension.

In all the instances in which I have determined the effects of spirit of nitrous ether on the circulation, I have observed like results, but the effects have been usually not so long-lasting as in this case. V. C., though otherwise healthy, was weak from the results of bowel catarrh, and his circulation was somewhat readily nifluenced by drugs as well as by excitement.

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[1] It is usually supposed that the separation of two per cent. of an ethereal liquid on the addition of calcium chlorate to spirt. æth. nitr. indicates the presence of ten per cent. of nitrite of ethyl. Dr. Dupré, however, in a paper published in the *Pharmaceutical Journal*, August 2, 1879, says that spirt. æth. nitr., prepared by the B.P. process and answering to the B.P. test, may only contain three per cent. of nitrite of ethyl.

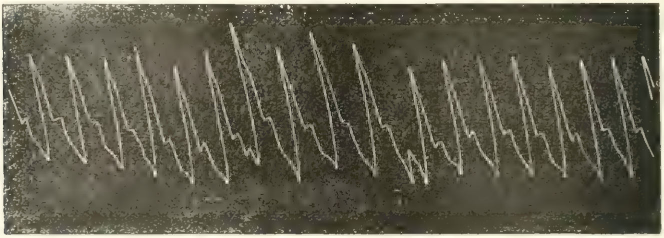

FIG. 1.—Tracing of pulse from V. C. before, and ½ and 1½ minutes after, the administration of 2 minims of spirit of nitrous ether.

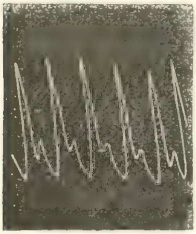

FIG. 2.—Tracing taken 3 minutes after administration of the dose of ij. ♏ of spirit of nitrous ether.

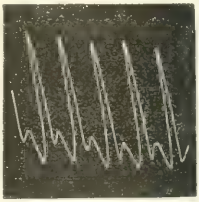

FIG. 3.—Tracing taken 3 minutes after the dose.

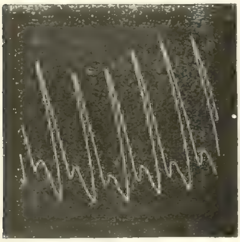

FIG. 4.—Tracing 30 minutes after the dose.

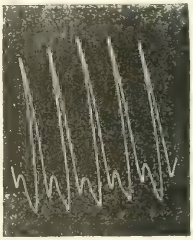

FIG. 5.—60 minutes after the dose.

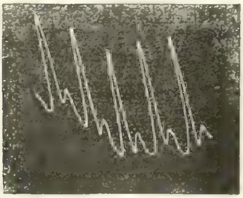

FIG. 6.—80 minutes after the dose.

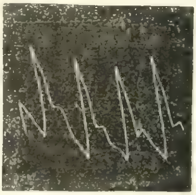

FIG. 7.—3¾ hours after the dose.

In order to ascertain whether the rectified spirit which formed so large a proportion of the sweet spirit of nitre had any share in the production of the effects above noted, we administered on the day following 100 minims of spirt. vini. rect., and my House Physician, Mr. Harvey Jones, to whom I am much indebted for aid, took a series of tracings which proved that this quantity of spirit did not influence at all the tension of the pulse.

The annexed tracings show the effects of spiritus etheris nitrosi on the pulse of the same man in doses of fifty and twenty-five minims, some days afterwards.

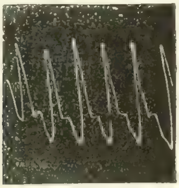

FIG. 8.—Tracing of pulse before the administration of 50 minims of spirit of nitrous ether.

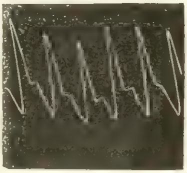

FIG. 9.—10 minutes after the dose.

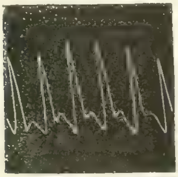

FIG. 10.—30 minutes after the dose.

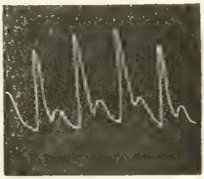

FIG. 11.—One hour after the dose.

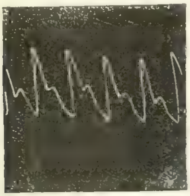

FIG. 12.—Before administration of 25 minims.

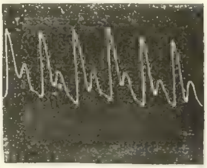

FIG. 13.—8 minutes after the dose.

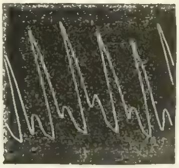

FIG. 14.—50 minutes after the dose.

It will be seen that an hour after fifty minims the tension was not fully restored. I have seen the effect of the drug in this dose perceptible for 150 minutes, whilst twenty-five minims will at times affect the pulse for eighty minutes.

The duration of the influence recognisable by the sphygmograph depends on the conditions of the circulation, and hence varies somewhat in different individuals. It varies, too, to a certain extent in different individuals at different times. V. C. took the nitrous ether on many occasions; only once after taking 100 minims did he complain of slight throbbing in the head and giddiness. On another occasion, when the tension was at the lowest, he broke out into a profuse perspiration. After the smaller doses he felt no effects. As a rule, indeed, I have not found the spiritus etheris nitrosi produce sensations or feelings indicative of the altered condition of the circulation, even when the pulse-tracing has been markedly affected.

The following tracing was taken from the pulse of Mr. Evans, one of our House Physicians at the Manchester Royal Infirmary, after the administration of 100 minims of spiritus etheris nitrosi. I may say that the clockwork of the instrument used has a slower rate of speed than that employed in the case of V. C.

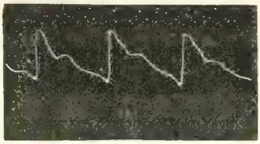

Fig. 15.—Before 100 ♏ of spt. æth. nitr.

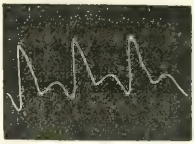

Fig. 16.—8 minutes after.

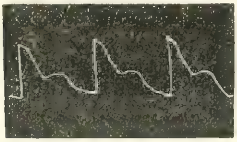

Fig. 17.—35 minutes after.

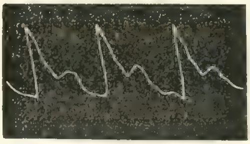

Fig. 18.—60 minutes after.

Save for slight eructations of nitrous gas Mr. Evans says he felt no results from the dose he took. As a rule, indeed, the administration of ʒijs. to ʒij. of spirit of nitrous ether is not followed by any distinct alterations in the feelings indicative of the effect on the pulse which is invariably produced. This absence of subjective symptoms, when the circulation is so evidently influenced, is worthy of note.

Sometimes, however, a full dose of the spirit causes a slight feeling of faintness and depression. I have myself experienced this, and can call to mind instances in which patients have complained of similar effects. A medical friend of mine informs me that even moderate doses invariably influence him in this manner.

The tracings show that an increased pulse-rate always accompanies the decreased tension, but I have not yet satisfied myself as to the exact relation between rate and tension at various periods. The frequency of the heart-beat appears not to be accelerated so markedly as by nitrite of amyl and nitroglycerine; and indeed at times, especially when small doses are given, the accelerating effect is very small.

Into the precise manner in which spirit of nitrous ether produces its effects on the circulation I shall not here enter. Its action is evidently analogous to that of nitrite of amyl, and it probably influences the same tissues. I have never seen proof of its effects on the nervous system. In large doses the spirit with which the ether is associated will lead to the antispasmodic effects alluded to by Wood; but the ether in itself has probably some influence, for there are indications that it affects the muscular walls of the stomach and intestines,[1] and it is quite possible that it may be found to depress the motor functions of the cord like amyl nitrite.

The therapeutic *rôle* of spirit of sweet nitre is due almost entirely to its influence on the circulation; and a consideration of the manner in which this influence is exercised will, it seems to me, enable us to understand its failures and its successes as a remedy.

It is for its diuretic and diaphoretic properties that it has chiefly been used; but it is also described as a grateful stimulus in restless irritable conditions (W. Smith); as a cardiac stimulus

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[1] Kraus notes colic and vomiting as present in a boy who took ʒj. of nitrous ether. Traupt suggests this was due to free nitric acid contained in the liquid, but a colleague of mine tells me he always suffers from colicky pains if he takes the pharmacopœial sp. æth. nitrosi.

(W. Smith); as useful in children with fever, offering nervous symptoms such as startings, jerks, etc. (Wood); as a febrifuge by many writers. It is by virtue of its tension-reducing effect, I think, by its power of dilating the arterioles in certain parts, that spiritus etheris nitrosi acts as a diuretic. It seems probable that any agent which increases the rapidity of the blood-flow through the vessels constituting the Malpighian glomerulus is capable of increasing the secretion of water, and that both those which raise arterial tension and those which decrease it may, under different conditions of the circulation, in this way promote diuresis.

Dr. Murrell's experiments with nitro-glycerine in a case of epispadias distinctly prove that this drug is capable of increasing the urine-flow. And in the absence of any facts tending to prove that nitrous ether stimulates the kidney secreting structures specially, we may fairly conclude that the diuretic properties of sweet spirit of nitre depend on its influence on the circulation.

Now if this be the case, the failure of spiritus etheris nitrosi as a diuretic so often noticed may be readily accounted for. Christison and many other writers speak of the frequency with which the drug disappoints our expectations when given as a diuretic; but since it is probable that it only acts if decrease of tension is necessary for diuresis, we cannot wonder that the expected result is often wanting. In cardiac dropsy, for example, the indications for spiritus etheris nitrosi will rarely be present, and it is in cardiac dropsy that its failure to produce increased secretion has been specially noted. Many years ago, I noticed that spiritus etheris nitrosi was especially useful in elderly people, with whom indeed it is the most popular domestic remedy for defective urinary secretion. It seems probable that its value in such cases may be connected with the increased tension not unfrequently the consequent of tissue degeneration.

The short duration of the action of nitrous ether on the circulation will explain the want of permanence of its effects as a diuretic, even when it promotes excretion of water, as compared with digitalis. The diaphoretic influence of sweet spirit of nitre may be explained, like its diuretic influence, by its effects on the circulation. Under certain conditions the dilation of the cutaneous vessels to which it gives rise is followed by perspiration, but since that dilation is only one factor in the production of perspiration, the diaphoretic effects do not always follow the exhibition of the spirit. The connection between its influence on tension and its diaphoretic effect may enable us to judge of the probability of its usefulness as a diaphoretic in individual cases.

The tracings I have given explain the supposed stimulant effect on the heart mentioned by Smith. It is evident that it may cause a tense small pulse to become fuller and stronger to the feel and quicker. The heart's beat, too, may become perceptible to the patient under the influence of the ether, as it often does after the exhibition of amyl nitrite; and the change which it effects in the circulation may also account for its utility in certain nervous symptoms in children to which Wood calls attention.

With regard to the febrifuge action for which it is largely administered, there seems little doubt that this is also connected with the effect it has in dilating the cutaneous vessels and thus exposing a larger amount of blood to the air. It may, however, be connected with some direct influence of the drug on the tissues; for Wood has noticed that the fall of temperature which in animals follows on the exhibition of nitrite of amyl is accompanied by diminished excretion of $CO_2$.

I have not yet had the opportunity of trying spiritus etheris nitrosi in angina pectoris. That it will be useful Dr. Hay's observations show, since he found its essential constituent, nitrite of ethyl, effectual in averting the attacks. It seems probable that it will not replace nitrite of soda or nitro-glycerine as a preventive of anginal attacks, yet it seems worthy of trial. Wherever indeed nitrite of amyl or soda, or nitro-glycerine, can be used beneficially, there we may find place for the use of nitrous ether. Asthma, some forms of headache, and certain disorders of menstruation have been benefited by nitro-glycerine. May it not be that in some of these ailments we shall find the exhibition of pure spirit of nitre beneficial; that our failures with it have arisen partly from the use of an impure spirit, partly from the want of knowledge as to the physiological effects on which its therapeutic uses depend; and that the use of the genuine drug in proper cases may show us that the popular belief in the efficacy of sweet spirit of nitre is founded on fact?

# NOTES ON THE ADMINISTRATION OF QUININE.

BY DAVID YOUNG, M.D., ROME.

In a city like Rome, where one frequently meets with cases of fever, as in all large cities, the question as to the place which quinine should hold in our therapeutic armamentarum is rendered somewhat difficult by the fact that unlike the greater number of our large continental cities Rome is surrounded by a malariously affected area; and though it thus presents a good field for the study of fevers, the difficulty of their differential diagnosis is considerably enhanced. This is a point of some importance if what I advanced in my last paper be true, viz. that a case which might prove amenable in its early stage to the action of quinine, behaves in a very different manner if it is neglected and allowed to go on till symptoms of an adynamic nature showed themselves. That quinine has, however, been used in many of these cases of fever in a far too indiscriminate manner is a fact which every physician conversant with the subject will readily bear testimony to, while in others the drug has been pushed in many instances contrary to the clearest clinical and physiological warnings. Every contribution, then, to our knowledge of this important subject cannot fail to yield results of the highest practical value; and it is in the hope that such results may accrue that I venture to give in this paper my own experience during a residence of eleven years in Italy. And first of all I would remark that much harm is unconsciously done by many physicians advising their patients who are about to travel to begin a regular course of quinine the moment they cross the Italian frontier. Nothing can well be imagined as more pernicious than advice of this kind, and yet every year a large number both of English and American travellers are found following it, and the consequence is that a considerable number of travellers are met with seeking advice for what proves to be cinchonism, the result of their too faithfully following the well-meant but unwise advice just referred to. There can be no doubt that quinine is a powerful prophylactic against malaria, more particularly in those districts where the disease assumes an intermittent rather than a remittent form, but in the case of Rome very few indeed of the visitors are affected with intermittent ague. They are, however, often the subjects of remittent and typhoid fevers, and this will excite no surprise when the mode of life and the utter neglect of anything like ordinary precautions on the part of the unacclimatised visitor to Rome are attentively considered. Now it is just in many of these cases of remittent fever and in other cases where the diagnosis is in the beginning somewhat doubtful that the hasty administration of quinine is capable of doing much harm; for although both remittent and intermittent fevers appear to arise from the same cause, and present clinical features very much resembling each other, and may even alternate and replace one another in the same individual, yet there is a difference between the two types. And just as the remittent fevers of temperate climates are as unlike the intermittent forms occurring in the same climates as the remittent fevers of tropical climates bear a strong resemblance to tropical intermittents, so even in the latter case, where both types present a striking similarity in their clinical features, there is a great diversity in their respective behaviour towards quinine. Further, whereas in the case of purely intermittent ague quinine maintains its curative power over the disease for a long period, with remittent fever the case is oftentimes very different; and not only does the alkaloid seem to enjoy a much shorter period during which it is capable of displaying its therapeutic power, but it is also a more difficult matter to prognose the value of the remedy in any given case. During a series of observations on this subject the two following cases occurred, within my own knowledge, and one of which I saw in consultation, which made a very deep impression upon my mind. I give them somewhat fully, as the lessons to be learnt from them are exceedingly valuable.

Mrs. S., an English lady, aged sixty, returned to her hotel cold and tired after an exhaustive day's sight-seeing. Rain had fallen during the afternoon, and she was caught in one heavy shower. She tried to take some dinner, but was obliged to leave the dining-room, feeling faint and ill. She drank a tumbler of hot lemonade at the suggestion of the chambermaid and went to bed. She sent for a physician next morning, and on his arrival the patient presented the following symptoms:—"Complains of great headache, pains down back, loins, and limbs, great prostration, intense thirst and restlessness." On examination the temperature was found to be 101·5 Fahr.; pulse full and bounding, 88; tongue thickly coated with a whitish-brown fur; skin dry and pungent; bowels disturbed, and a feeling of distension over the abdomen; three scanty fluid motions tinged with bile had been passed during the night; urine small in quantity and high-coloured. Six grains of the bisulphate of quinine were ordered every four hours. After the fourth dose she complained of the headache being much worse, of noises in the ears and deafness. After the sixth dose she had an attack of violent nose-bleeding, followed by slight relief from the headache. Immediately after the seventh dose she was seized with a convulsive fit which lasted several minutes: two hours later she had another from which she never rallied. Her temperature had been as follows:—

| | | | | |
|---|---|---|---|---|
| First day, | 10 A.M. | 105·5 Fahr. | 9 P.M. | 102·2 Fahr. |
| „ | „ | Pulse, 88. | „ | Pulse, 94. |
| Second day | „ | 102·1. | „ | 102·7. |
| „ | „ | Pulse, 91. | „ | Pulse, 98. |
| Third day | „ | 102·3. Pulse, 90; wiry. | | |

The bowels remained in the same irritable condition, and between three and four scanty fluid motions were passed during each day. Urine scanty, but no examination made of its solid constituents. The patient died at three p.m. on the third day. The above notes I am enabled to give through the courtesy of the physician who was in attendance. The next case I saw in consultation.

G. H. I., a young, well-built, plethoric Englishman who had been seized with a slight shiver, followed by headache, pain in his back and limbs, and general feverishness. On the morning after his seizure his temperature was 100·8 Fahr. (the temperature during the first four days is given below), the tongue covered with brown fur, bowels confined, thirst and great disinclination for food. Bisulphate of quinine in eight-grain doses was ordered every six hours. The second dose was followed by a great increase of the headache, noises in the ears, and deafness. The quinine was continued in six-grain doses, but the patient's state became worse in every way. During the night he became wildly delirious, the delirium bearing a strong resemblance to delirium tremens, and the case might have been easily mistaken in this particular. The patient was most temperate in his habits and gave no support to such a notion, yet I confess I was much surprised when I saw him for the first time on the morning of the third day of his illness. On entering his bedroom he covered his face with his hands and with a shriek sidled away to the further side of the bed. He answered questions very incoherently, and suddenly broke off and began to search under the bedclothes for some creature which he was sure lay hidden there. He had had no action of the bowels for forty-eight hours, and only passed a few ounces of dark-coloured urine about once in twelve hours, although he made ineffectual attempts to urinate at frequent intervals. The quinine was immediately stopped. Calomel in two-grain doses was ordered every two hours, till the bowels were relieved; ice was applied to the head; and cooled Apollinaris water given freely to drink. After taking the fourth dose of calomel the bowels acted well about 9 P.M. accompanied by a copious flow of dark urine; he then went to sleep, and slept quietly for about six hours, and awoke free from delirium. It proved to be a case of typhoid fever, which ran its course in thirty-one days, and from which the patient made a good recovery. The following are a few particulars of the first four days of the illness:—

| | 10 A.M. | | 10 P.M. | |
|---|---|---|---|---|
| First, | T. 100·8. | P. 82. | T. 101·3. | P. 88. |
| Second, | T. 101. | P. 85. | T. 102·1. | P. 94. |
| Third, | T. 102·6. | P. 96. | T. 101·8. | P. 88. |
| Fourth, | T. 101. | P. 86. | T. 101·5. | P. 88. |

The bowels acted once slightly on the first day, and not again till 9 P.M. on the third day, after taking eight grains of calomel. On the morning of the third day the urine was scanty, high-coloured, specific gravity 1025, and contained an excess of common salt, urea, and uric acid. On the morning of the fourth day the urine had greatly increased in quantity, the solids just referred to were diminished, and the specific gravity fell to 1021.

These two histories are fitted to teach among others one great lesson, and that lesson is that quinine in antipyretic doses in certain conditions is a drug not to be administered with such impunity as is generally believed. The second case throws considerable light upon the first one; and had the drug not been promptly stopped, the consequences in the one might have been as serious as in the other. The warnings were sufficiently clear in both cases that the remedy should not have been persevered with in the face of such contrary indications.

The question of the selection of cases suitable for the administration of quinine has been further hindered by a belief on the part of many patients—a belief also shared in by not a few eminent physicians—that they cannot take quinine in any form or in any dose; and I have met with such persons in Italy, who told me that they were advised by their own medical man at home that whatever happened to them they were to assure any physician whom they might have occasion to consult that they could not take quinine. Now there is no doubt that there are some persons who seem to have a constitutional antipathy to the action of this drug, but I am inclined to think that the number of such persons is smaller than is generally supposed, and that where it is not tolerated there is a physiological reason for it, and that ere long investigation will discover what this reason is, and enable us to administer quinine in such a manner as will insure its toleration in at least a large proportion of those cases which have hitherto been supposed to be unsuitable subjects for it. It is a curious fact that the same widespread belief exists in regard to the use of iron; and many young chlorotic females who are sadly in want of more iron in their blood are found to be just those who for some reason or other cannot take it without being greatly disturbed by it, and so the remedy which above all others is the one they most stand in need of is unavailable for them. Doubtless in many of these cases the first thing the physician has to do is to *prepare* the system for the reception and assimilation of the remedy, but in many others he can at once begin the administration of iron if he will only combine any simple saline with it. Such a combination will be readily borne where iron given in a pure state would not be tolerated. The same thing holds good of digitalis, whether given as a cardiac tonic or depressant. I have frequently failed to see the usual action of this drug manifested until a saline or other aperient was given, and then immediately the drug seemed to be endued with new energy; and this has in my experience always been the more marked where a *saline* was given in preference to any other medicine. These instructive therapeutic relations which subsist between certain remedies are of great importance, and may be found to explain why it is that a drug which acts with so much energy to-day is powerless in a case of the same disease to-morrow, or how a case of chronic intermittent ague will defy quinine and yield to arsenic, or what is more curious still, will yield to Warburg's fever-drops, a well-known, popular remedy containing quinine in varying proportions as its chief ingredient, in combination with a few other apparently unimportant substances. Reflecting on these cases, I was led to try the combination of quinine with chloride of ammonium or a salt of potash in cases where the former failed alone or where the patient was supposed to be unable to take quinine, and the results were so satisfactory that for more than four years I have adopted this course and found it to answer admirably, although in a few cases it has certainly failed. The first case was that of a young English lady, aged eighteen. This young lady was suffering from well-marked intermittent fever, accompanied by most distressing tinnitus aurium; the latter affection, however, she had had for several years, but it always became worse during the attacks of ague. She could not take quinine, and when I first saw her she was taking five-minim doses of the tincture of iodine for the relief of the tinnitus, but without any effect. In treating this distressing symptom I had often found chloride of ammonium useful, and so I resolved to try it in combination with quinine. I ordered twelve grains of the chloride with one grain of the bisulphate of quinine every four hours. In two days the tinnitus was considerably relieved, but no impression had apparently been made upon the ague. I now increased the quinine to three grains for each dose, and in a week all trace of ague had gone, and the patient never knew that she had been taking quinine.

The next case was that of an old Indian officer, who had suffered severely from ague during his residence in India. The evening before I saw him he had been caught in a heavy shower on his return from the theatre, and before he reached home had got thoroughly wet. Next morning he awoke feverish, and complained of a severe headache. The patient seemed to have taken a bad cold from his exposure and nothing more, but on further inquiry one or two other symptoms suggested the possibility of its being more than a simple influenza. He had been sneezing violently, it is true, and complained of a good deal of aching about his limbs, but besides these there was considerable nausea and dislike to food; the bowels had acted several times—the motions being scanty and of a bilious character—and there was a degree of prostration greater than one usually sees in such cases. Moreover the patient felt convinced that he was having a return of his Indian fever, and this he very much dreaded, as although he could take quinine it invariably caused such an intense headache and general disturbance—completely taking away his appetite—that he feared the remedy more than the disease. Knowing the effects of the chloride of ammonium in some forms of biliary derangement, I decided to give it at once in combination with quinine, and accordingly ordered ten grains of the former with four grains of the latter every six hours. Before he had time to take the first dose, he had a distinct shiver followed by great feverishness, but this was not repeated; the symptoms rapidly improved, and in four days he was able to leave his room, declaring that he had never taken quinine with less trouble or better results.

It seems therefore probable that investigation in this particular path of therapeutic research may lead to a clearer knowledge of the causes which operate against certain remedies, and that we shall be able, either by neutralising substances already existing in the blood and having an antagonism towards the remedy we desire to employ or by supplying other substances to the blood, either prior to or along with our remedy, which have a known auxiliary power with that remedy against any particular disease, to use many well-known drugs not only with more precision but with more success; and this hope is further strengthened by the fact that great chemical changes are not only always going on in the living body, but these changes, as revealed by their products in the urine, are nowhere more clearly manifested in their variations than in the several stages both of remittent and intermittent fevers, although so far as physiological research has yet gone they appear to be less well defined in each stage of the former than in the latter. Pointing in the same direction are many popular beliefs existing amongst residents in malarial countries as to the antagonistic effects of certain articles of diet—coffee for example—towards the cinchona alkaloid.

I had observed that a large proportion of these cases presented themselves under one or other of three fairly well-marked clinical types.

The first very much resembling an ordinary case of la grippe or influenza, accompanied by nausea and a disturbed condition of the bowels: the second more like sthenic fever, with a dry, pungent skin; bowels confined; great thirst, and scanty flow of urine: while the third was ushered in much in the same way as an attack of acute rheumatism. And in all of them the quinine given in combination was found more successful than when given alone. The combination for the three types which I have found most useful are:—

℞ Ammonii chloridi, ʒij,
Quiniæ bisulphatis, gr. 48,
Ext. glycyrrhizæ, ʒiij,
Aquam ad ℥vi. Misce.

A tablespoonful in half a wineglassful of water every six hours.

℞ Potassæ citratis, ʒiv,
Quiniæ citratis, ʒi,
Syr. zingiberis, ʒvi,
Aquam ad ℥vi. Misce.

Directions same as above.

℞ Sodæ salicylat. ʒj,
Quiniæ salicylat. gr. 48,
Syr. zingiberis, ʒvi,
Aquam ad ℥vi. Misce.

Directions same as above.

The following are suggested as containing the pith of what is here written.

I. Never to give quinine in antipyretic doses in cases where the bowels are confined and the secretion of urine is scanty.

II. In cases where it is being administered and an increase of dose is desirable, this may be safely done if the skin, bowels, and kidneys maintain their normal functional activity.

III. In many cases of remittent and intermittent fevers, the combination of the drug with chloride of ammonium or a salt of potash or soda is likely to be more easily tolerated as well as more useful than if it be administered in a pure form.

IV. During the administration of quinine, should a headache come on or increase in intensity, the case requires the most careful attention.

# ALLEVARD-LES-BAINS AND THE INHALATION TREATMENT OF LUNG DISEASES.

BY LAUCHLAN AITKEN, M.D. (OF ROME).

It is certainly somewhat curious that so little should be known in Great Britain about Allevard-les-Bains and the treatment of lung diseases by inhalations pursued there; and although it has enjoyed considerable reputation in France, Switzerland, and Italy for forty years or more, very few English or Americans have ever visited it. The works on mineral waters in our language either ignore its existence altogether, or make a bare mention of it; and more will be found about its uses in Murray's *Guide to the East of France* than in such technical books as Weber's *Translation of Brown's Balneology*, or McPherson's *Baths of Europe*. Dr. Edwin Lee, it is true, as far back as 1868, gave a fair account of it in his *Notices of the Baths of Dauphiny*, but as these were published as a supplement to his book on the *Principal Baths of France* they did not excite the attention they deserved. The French literature on the subject, on the other hand, is extensive, as, besides notices in the general guides to their mineral waters, it includes works of all dimensions, from the thick octavo volume of Professor Dupasquier of Lyons, published in 1841, and devoted exclusively to the consideration of the chemical and medicinal properties of the sulphur water of Allevard, with a description of the charms of its situation, to the smallest pamphlet on its virtue in some one ailment which only appeared last year. The reasons for our neglect cannot be from its lying in any inaccessible spot. They do not arise from that want of comfort which prevents us sending our patients to many a valuable water in Italy, nor are they to be attributed to such an excess of heat as would make the season there intolerable to our constitutions. Allevard is at no such remote distance, as it lies in one of the smallest though loveliest valleys of Dauphiny, close to the confines of Savoy. This valley, which has the same name, runs almost due north and south for a stretch of some twelve kilometres, forming a basin about two kilometres wide between the well-wooded and cultivated slopes of Mont Ouvrard and the Brame-Farine,[1] which shelter it on either side. Somewhat shut in by lofty hills to the south, and ending in the north in the bold rounded mass of Sant Marguerite, which seems thrown as a bulwark across the valley, but is not high enough to prevent the well-defined peaks of the mountains of Upper Savoy being clearly visible, it is certainly a picturesque spot, and as such has long been known to tourists and artists, from whom it has received the resounding title of the Switzerland of Dauphiny. The little town or village of Allevard lies midway in the valley, on either bank of an impetuous mountain stream, the Breda, just where it issues from a fine gorge, through which its snow and glacier-fed waters rush in many a cascade and fall to intersect the valley, and escape from its north-western extremity to join the Isère, the river which gives its name to the department in which Allevard is situated. It is a small place, containing about 3,000 inhabitants, many of whom are engaged in the large iron foundries built on the side of the Breda in the gorge just mentioned, and whose furnaces are kept in full blast by the richness in iron ore of the neighbouring mountains. The village, for it is little more, is somewhat dirty, and presents few attractions, except that every here and there through its narrow streets the visitor may come across some charming peep of green mountain side, of snowy peak or glacier, or of the Breda rushing as a foaming torrent through parks whose trees overhang its waters, or between the old houses or huts of the iron-workers, whose moss-covered irregular roofs and gables offer many a charming sketch. Allevard, however, is improving rapidly under the influence of the money which the visitors have left in it, and there are many fair lodgings and several excellent hotels, where even very fastidious visitors will find good food, comfort, and cleanliness, except in that one important matter, the sanitary arrangements, in which they present the same grievous faults English physicians recognise as common to almost every hotel on the Continent.

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[1] It is said that this curious name is probably from the Latin *Mons Cramantium ferinarum.*

In recommending a mineral spring to patients, with lung affections particularly, the first consideration would naturally be the climate. Most of the sulphur and thermal waters of France much frequented by such cases are at considerable heights. The mean elevation of the valley of Allevard is about 470 metres—1,542 feet—and the climate is not so variable as at the much higher altitudes of most of the Pyrenean spas, and of Mont Dore. The season is, therefore, a longer one, and patients arrive in the beginning of June and stay on well into September, whereas the two months of July and August may be said to be the only safe ones for treatment at springs which are at double the height. The third week in June is probably quite as early as those seeking relief for lung diseases should begin their "cure" at Allevard. The heat in the valley during the day is sometimes very great, though an evening breeze usually springs up and keeps the nights fairly cool. From the observations of Dr. Niepce (fils) the mean temperature of the summer quarter —June, July, and August—is 18·08° C. (64·5° F.), the mean relative humidity is 63·70, and the average rainfall 333·08 mm., about 12½ inches, while rain falls, it seems, at some time or other, on thirty-five days, or at least that was the average number for these months in four consecutive years. The rainfall is large, though, perhaps, not astonishingly so, as it mostly comes in violent thunderstorms, which often break over the valley owing to its position in the midst of chains of mountains to be reckoned amongst the monarchs of the Alps, and thus benefit the visitors by preventing the temperature rising to any unbearable degree. The highest temperature noted during my stay from June 24th to July 14th was 30·5° C. (87·3° F.), and in my own room with a south-eastern aspect 76° F. Visitors undergoing treatment, and more particularly those with lung affections, ought most carefully to avoid exposing themselves to the currents of cold damp air which the headlong rush of the icy waters of the Breda produces, and that not only in the evening, when the difference of temperature between the gorge and the more open valley into which it debouches is very striking, but also during the day immediately after taking douches or inhalations, or when overheated by exercise. Some most unfortunate results of such imprudence are reported by the local practitioners.

The medical history of Allevard is fortunately a short one. The Romans knew nothing of its waters, and we are, consequently, spared the learned disquisitions on their bath arrangements and on the treasures they have left as mementos of their sojourn, which the friends of so many a spa in Italy and the south of France inflict upon us. The valley has an interesting history of its own in mediæval and renaissance times, but we hear not a word of its mineral waters, nor did any of the celebrated French authors of last century bring it into vogue, as was the case with Vichy and with some of the Pyrenean springs. The black water, as it was called, which flowed along the banks of the Breda just as it entered the valley of Allevard, had been occasionally used by the peasants, and even prescribed by the local practitioners in different diseases, though apparently without any importance being attached to it, until the success of the waters of Uriage, in the same province of France, drew the attention of the inhabitants of Allevard to the profits accruing to the lucky possessors of such valuable mineral springs. This was not quite fifty years ago, and the first primitive baths which had been opened close to the spring in the narrow cleft between the hills through which the Breda has forced its way, had only been in use about two years when the water was bought by some speculators, who at once erected the building which still forms the nucleus of the present establishment, at a distance of about 300 metres from the source in an open and yet well-wooded park, very different from the gorge which the rush of the Breda keeps chilly and damp. Since then the mineral water has several times changed hands, but improvements have constantly been made, and the establishment, though not a very large one, is very complete in all respects, as it contains, besides the ordinary appliances for drinking, bathing, douching and massage, a large room for gargling, another divided into compartments for the different sexes for douching the pharynx, the nostrils, the eyes and external auditory passages, separate rooms for foot baths and for ascending douches, and others for shower baths, circular douches, and Scotch douches, as alternate hot and cold douches are called abroad. A recent addition has been a compartment with very perfect apparatus for spraying the pharynx, larynx and trachea with the water, and as steam is used instead of compressed air this pulverisation, as the French call it, is simply that from any ordinary steam spray produced on a larger and more effective scale. Besides these are the inhaling rooms for warm and cold inhalations of the gaseous emanations from the water which must be described more in detail. For the real specialty of Allevard, that which gives its characteristic to the treatment pursued there is undoubtedly the systematic use of inhalations in diseases of the lungs and air passages. These inhalations are of two kinds, the cold and the tepid. The former are carried out in a number of tolerably large and well ventilated rooms, into which the water from the source is introduced in the form of a vertical jet in the centre of each room, which, rising to a certain height and striking against a cylindrical metal plate pendent from the roof, falls back in a shower into a large round basin and through its overflow pipe over a series of shallower reservoirs increasing in size from above downwards, thus permitting the water to be subdivided into fine streamlets and spray, and by its exposure to the air facilitating the disengagement of much of the gas it contains. It seems that not less than 95 per cent. of the sulphuretted hydrogen is thus freed and mixes with the air in the room, but, as there is no visible vapour, and as the room has the same temperature as the outer air, though not quite so variable, the patients can sit chatting, reading, writing, working and inhaling the atmosphere during the time recommended to each. Strange to say no exact analysis of the volume of sulphuretted hydrogen, nitrogen, or carbonic acid gas in the air of these rooms at different periods of the inhalations has yet been made, but to avoid the danger of their becoming surcharged with the different gases the rooms are used alternately, the windows of those rooms not in use being thrown wide open and the jet of water cut off. The same room is thus never used for much more than thirty minutes at a time. It is customary for the early sittings to be made very short, five to eight minutes, increased afterwards from ten to fifteen minutes, and the later ones from twenty to twenty-five minutes, and, as an interval of at least a quarter of an hour is prescribed between each period of inhaling, the patients are constantly going to and from the different rooms. Six to eight sittings daily are often thought necessary though many do not take more than the half. There are first and second class inhaling rooms, the former a little more comfortably furnished, though offering a greater advantage perhaps in the fact of their not being quite so crowded.

On entering an inhaling room the first thing noticeable is the smell of the sulphuretted hydrogen, which is very distinct. After being there for a short time, varying in nearly every case, a feeling of weight over the forehead, with slight oppression at the chest, inducing a deep inspiration or two, and a tendency to cough, are felt. These pass away, but if the early seances are made too long an acceleration of the pulse and giddiness ensue and are signs that the patient should leave, a few minutes in the air at once removing any such unpleasant effects. In a day or two, however, the patient becomes acclimatised, and no longer notices such results, and the sittings may then be prolonged. The respirations and the pulse are then said to be diminished in frequency, though I could never notice any perceptible change in my own state even after being twenty-five or thirty minutes in the room, except an increase in the feeling of frontal uneasiness. Those suffering from chronic bronchial troubles and asthma have a sensation of warmth in the tubes, but, should the sitting be too prolonged, this feeling sometimes increases to an unpleasant degree, and hæmoptysis has been known to follow from such imprudence. The frequent changes from one inhaling room to the other prevent the carbonic acid increasing so as to become a danger to the patients. Dr. Niepce, who was the originator of this treatment, declares that the utmost duration of one sitting should be forty-five minutes.

The treatment by tepid inhalations is carried out in a different way. The jet of water is, indeed, finely subdivided by the same process as just described, but, in addition, the rooms used for this form of inhaling are in communication with large boilers, whence sufficient steam is brought to raise the temperature to 26° or 28° C. The rooms are thus filled with a warm fog, dense enough to prevent one seeing across them, and so wetting as to compel those sitting in it to be undressed or covered with a macintosh or wrapper. What actually happens is that the steam condenses into the finest droplets, and that the patient is seated in a spray of the utmost density, in which he inhales the gases along with the spray for the time prescribed. The tepid inhalations are used, as we shall presently see, in very different conditions from those in which the cold are indicated.

It is much to be regretted that no analysis of the water of Allevard exists, which can be looked on as satisfactory at the present day. The original work done by Professor Dupasquier, of Lyons, who wrote a large volume on the subject, is still the accepted guide to the chemical constitution of the spring, and, although the presence of other elements than he found in it in 1838 has been proved by Dr. Kastus, no quantitative estimate of those nor any correction of Dupasquier's analysis have been made.

There is only one kind of mineral water at Allevard, the spring already mentioned, which at the source has a very constant temperature of about 16°·7 C., 62°·06 F. It is, therefore, a cold sulphur water,[1] and the analysis shows that the gaseous elements exist in it in a large quantity. In a litre there are :—

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| Carbonic acid gas . . | 97 | cub. centimetres. |
| Free sulphuretted hydrogen . | 24·75 | ,, ,, |
| Nitrogen . . . . | 41 | ,, ,, |
| | 162·75 | |

| Solids. | Grammes. |
|---|---|
| Carbonate of calcium . . . . | 0·305 |
| Carbonate of magnesium . . . | 0·010 |
| Chloride of sodium . . . . . | 0·503 |
| Chloride of magnesium . . . . | 0·061 |
| Sulphate of calcium . . . . | 0·298 |
| Sulphate of magnesium . . . . | 0·523 |
| Sulphate of sodium . . . . | 0·535 |
| Silica . . . . . . . | 0·005 |
| Iodides . . . . . . . | 0·006 |

Sodium and magnesium (Kastus).

Traces of bituminous matter and glairine.

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[1] Dr. Weber, in Quain's *Dictionary of Medicine*, puts it by mistake among the thermal sulphur springs, and Dr. Vintras, in his recent *Medical Guide to the*

To these must be added two other elements found in it, along with iodine, by Dr. Kastus, phosphoric acid, probably as phosphate of calcium, and lithia, as a bicarbonate, though the quantity is undetermined.

Durand Fardel at first classified the water among the lime rather than the soda-sulphur waters, but owing to the quantity of sulphuretted hydrogen existing free in it, the dominant element in fact, he afterwards formed a separate class of sulphur waters which he called the "sulphuretted hydrogen." It is nearly four times as rich in free sulphuretted hydrogen gas as Marlioz, the nearest water to it in France in this respect, and quite twice as rich as Luchon and Bigorre, where the element is only found free from the decomposition of sulphites. The water is colourless, or nearly so, at the source; smells strongly of sulphuretted hydrogen; if it is agitated in the glass, sparkles from the emission of bubbles of nitrogen, of which it contains about three times as much as a water at the same temperature would do, if exposed only to the ordinary atmospheric pressure, and is slightly acidulous to the taste. To prevent its decomposition on its way to the drinking-fountain at the establishment it is carried through glass pipes, and only loses about two cubic centimetres per litre, while the jet introduced into the inhaling room loses nearly five cubic centimetres.

As it is only possible for waters which contain their sulphur in the form of sulphites to disengage the sulphuretted hydrogen very slowly by the action of the carbonic acid of the air, it is obvious that they cannot serve for inhalations in the same way as the water of Allevard with its large amount of free sulphuretted hydrogen, which it readily parts with when finely subdivided. It is therefore to the sulphur in this gas that the main part of the effect produced by this water must be attributed, though, no doubt, its effect is modified by the other ingredients, such as iodine, which exist in it. The first physiological effect of a sulphur water, however used, being stimulating, it acts thus with as much or even more intensity on the mucous membrane

*Mineral Waters of France*, does the same thing, as he states that the temperature is 24° C. Whence he derives his information I do not know, as, besides this somewhat startling error in a guide to mineral waters, he puts the daily supply of the spring at 882,000 gallons, instead of 4,400 gallons, two hundred hectolitres, as Durand Fardel gives it.

of the respiratory passages as on the skin, as may be seen in the increase of cough and expectoration in bronchial cases, and this stimulation, which is valuable to torpid and lymphatic constitutions, may very easily be carried too far in the nervous and excitable. Whether the presence of the large amount of nitrogen and carbonic acid gases which the waters disengage along with the sulphuretted hydrogen diminishes the stimulating effect in a marked degree in the inhalation rooms at Allevard is a contested point, in respect to which we must bear in mind the decided sedative effect on the respiratory organs long claimed by Spanish physicians as the result of the nitrogenous springs at Panticosa, as well as the anæsthetic properties of the carbonic acid. However this may be, it is to the topical effect of the sulphuretted hydrogen on the mucous membrane of the air-passages that the Allevard practitioners are inclined to ascribe the improvement they see in diseases of the larynx and bronchial tubes, in asthma, and in certain cases of phthisis, and, as the elimination of the sulphuretted hydrogen, by whatever channel introduced into the body, is effected through the lungs, the local action in the tepid and cold inhalations takes place both at the entrance and exit of the gas.

The number of complaints for which the treatment at Allevard is recommended is so large that it would be absurd even to mention them all. As a cold sulphur spring of much power it may be successfully employed in some cases of skin diseases, but it would seem useless to send cases of rheumatic affections, sciatica and other neuralgias, or of old standing syphilis, where the object is to use hot douches, massage, hot baths, and so on, to an establishment where the water requires to be heated, when so many good natural thermal sulphur springs are known. The treatment is, therefore, more especially adapted for diseases in which the tepid and cold inhalations, the hot sprays and local douches of the throat, nostrils, and other organs, are thought advisable. All forms of chronic bronchitis, of asthma, of laryngeal affections, of clergymen's sore throats, and of tonsillar affections in children, constitute, therefore, the bulk of the cases at Allevard. In asthma, certainly, every one is inclined to look with much scepticism on dogmatic assertions as to the efficacy of any particular treatment, and the cure at Allevard need form no exception to this rule. Laure, a physician who practised many years there, writes in his work on the mineral waters of the place—"that pure nervous asthma, unconnected with heart diseases, readily yields to the inhalations, douches, and baths. Not one of his patients," he goes on to say, "left without experiencing great relief. If we were to seek for the specialty of Allevard, it is asthma I would specify;" but this has probably been said by every physician who has written on the benefit of sulphur waters in that disease, and it is more than likely that it is to the relief of the bronchial engorgement or inflammation that any diminution in the asthmatic symptoms is due. That patients with chronic bronchitis, winter coughs, and old-standing catarrhs of the respiratory passages are sometimes much improved by the inhalation treatment admits of no doubt. The evidence of the medical men is unanimous on the subject, and many of such sufferers pursuing the treatment assured me of their belief in the alleviation produced, while others had shown their faith by returning year after year to their favourite spa. In almost every instance, too, the first effect seemed to have been to aggravate the symptoms, and it is to this substitutive action that any subsequent amelioration must be referred. In cases where there is a dry cough, little secretion, pain in the chest, and other symptoms of acute irritation, the tepid inhalations are always employed at first, and after the modification of the symptoms the cold inhalations are cautiously tried, the earlier sittings being very short. In using a remedy of such unquestionable power as the inhalations at Allevard to delicate organs the greatest care and attention are requisite, and they are only begun in decided cases of phthisis with great caution. The objects sought to be attained have usually been the relief of the accompanying bronchial irritation and pulmonary engorgement and the prolongation of the period of quiescence, with concomitant improvement in symptoms such as the cough and expectoration and the restoration of general strength, and up to the present time the good results recorded have been mainly, if not altogether, regarded as produced in this way. In accordance with more recent views, it is true, the effects might also be thought due to the antiseptic virtues of the sulphur or iodine which the patients inhale in the rooms, and the treatment at

Allevard would thus be a natural way of attaining the same ends which seem nowadays to be so universally expected from respirators soaked with creasote, iodine, carbolic acid, eucalyptus oil, or other antiseptics. Apart from any theory, it is found that certain cases of phthisis do materially benefit by using the inhalation treatment, and cases in which cavities have apparently become cicatrised are reported and referred to successive seasons at Allevard, probably with as much justice as in similar instances from Davos or Mont Dore. The Allevard physicians are a little more modest than those in better known climatal resorts in urging that there are many phthisical patients whom the treatment is more likely to injure than to benefit.

Cases of irritable subjects with a strong tendency to hæmoptysis; those who have intermittent pyrexia, or night sweats, or violent diarrhœa; patients unable to digest, or to sleep fairly well, or who have lesions of both lungs at all advanced, or in whom the liver, spleen, and kidneys are involved, are said to come under the category of those whom the cold inhalations at Allevard will not probably suit—a large and important list of exceptions certainly, but one not rigidly adhered to, judging from the appearance of many of the phthisical patients to be seen entering the inhaling rooms. Any one using his eyes may convince himself that there are many cases of advanced phthisis seeking relief at Allevard, and some of those patients assured me of their belief in an improvement in their state, resulting from the treatment by inhalations which has been described. The statements of the Allevard physicians are positive on the subject, and, although that unconscious bias in favour of his specialty which influences even the most impartial of medical men is undoubtedly stronger in those who prescribe the mineral waters of the place where they practise than in any other class of the profession, yet the facts brought forward seem too convincing to be thus accounted for in every instance, and careful sifting of the evidence in favour of the treatment would probably show a fair proportion of cases in which alleviation had resulted.

Among the diseases in which good results often follow the use of such waters as Allevard must be included those chronic laryngeal and pharyngeal affections which frequently reflect but little credit on the ordinary medical treatment adopted to get rid of them. Those liable to be thus afflicted—clergymen, barristers, actors, singers, smokers and confirmed topers—find their way to spas, where there are all the necessary appliances for a treatment which can only be carried out with much inconvenience at home, and where the rest such a diseased organ as the larynx can have is an important element in the cure. It was a constant remark from all new comers, how many priests there were pursuing the treatment at Allevard. Cases of chronic tonsillitis among children, and of the various forms of chronic laryngitis, whose varieties have been multiplied by the laryngoscope, are not only much benefited by the use of the water as throat douches, sprays, and gargles, and by the tepid or cold inhalation of the gases, according to the indications in each case, but also by drinking the water, and by local cold, or alternate hot and cold, douches to the neck externally. The gargling particularly is practised most assiduously, and the patients are almost invariably recommended not to make the sound which gives the name to the proceeding, by sending air through the liquid in the back of the mouth, but simply to permit the fluid to bathe the soft palate, tonsils, pharynx, and, if possible, the epiglottis and upper part of the windpipe, for as long a time as they can, and very often during the day. The gargling room, with its long row of basins on either side, before which, sitting or standing, patients of both sexes are almost always engaged, is one of the most curious sights any spa can offer, and would certainly be a much more disagreeable one than it really is, but for the recommendation to use the fluid as a local bath rather than as a true gargle. In clergymen's sore throat, that chronic granular pharyngitis in which the hypertrophied follicles of the mucous membrane are seen as long ridges, or prominent patches on the posterior pharyngeal wall, and in which a similar condition is so apt to extend into the upper part of the larynx, the treatment by gargling, douching, and spraying is said to be very successful, and those who have vainly tried every form of astringent and caustic against this obstinate complaint are only too glad to send their patients to waters where the appliances are such as at least to hold out a hope of cure. The gargling or bathing of the pharynx is considered one of the essential features of the treatment in such cases, but much importance is also attributed to the douche or jet thrown on the back wall of the pharynx through a tube with a ball and socket joint rising from a basin in front of which the patient sits, and which he can direct at his pleasure against the hard or soft palate, the uvula, tonsils, or posterior pharynx, the water, if he hold his head slightly inclined forwards, flowing out into the basin again. It was evident that few of the patients understood how to allow the jet to strike the back wall of the pharynx without its exciting such violent efforts of retching as prevented them from continuing the douche for the time recommended. Still the shock of the jet on the congested and hypertrophied mucous membrane probably acts as a good mechanical stimulant to that renewal of healthy nutritive action essential to a cure, even when the patient is only able to bear for a moment the reflex action excited by the shock on the part of the lining membrane most affected. I suggested to the spa physicians that it would be useful to anæsthetise the pharyngeal mucous membrane by the use of preparations of carbolic acid or of the bromides before their patients sat down to the jet.

When the larynx is involved as well as the pharynx, hot sprays of the sulphur water are usually ordered to alternate with the douches.

Besides the apparatus in use for pharyngeal or laryngeal affections there are also special appliances for eye, ear, and nose douches, and the cases of chronic nasal catarrh and of ozæna following out the treatment are numerous.

The average number of patients who go to Allevard for the cure is from 1,500 to 1,800 annually, so that it is by no means a spa of the first rank. Probably from its position and the excellence of its arrangements the number will increase, since its inhalation treatment is quite distinct from that of Mont Dore, or of the Pyrenean springs, and has quite as much to be said in its favour, while Allevard has the advantage over them of being less fashionable and thus less gay and crowded, and more suited for pronounced invalids.

In travelling to Allevard the most direct route from England is to Paris, and thence by the ordinary express train to Italy as far as Chambery, changing there to the line Chambery-Grenoble, and stopping at the little station of Goncalin, where omnibuses are always waiting to take travellers to Allevard, a lovely drive of rather more than an hour; or the traveller may take the route by Lyons to Grenoble and thence to Goncalin, though that is a little longer. From the Riviera, visitors usually travel by way of Marseilles, Valence and Grenoble, though there is an alternative route by Marseilles to Gap and Grenoble, but they might proceed by rail to Grasse and thence by diligence or private carriage *viâ* Castellane, Digne and Monestier de Clermont to Grenoble. Those intending to pursue the treatment need have no hesitation in applying to the courteous inspector of the mineral waters, Dr. Isoard, who will furnish any information as to hotels and lodgings, or the probable necessary duration of the cure in any particular case. The Hotel du Parc, of which I can speak from personal experience, is admirably managed, and if patients secure rooms there with a south-eastern aspect they will be very comfortable.

# ROSEOLA AND MEASLES IN MAURITIUS.

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THE island of Mauritius has for the last six months been visited by two epidemics, one of roseola and the other of measles. Although these two diseases may be considered as endemic in the island, yet it must be stated that the former assumes an epidemic character every year in summer whilst the latter becomes so now and then only. This year it happened that both of them appeared at the same time, thus giving to the practitioner a favourable opportunity to compare them side by side. It was not only in that respect that their coexistence became important. There was besides another interest attached to the concomitant epidemics, viz., that they broke out in a malarial country, and that, whilst they were raging, malaria, which then was rife also, exercised a most remarkable influence over their course, development, and symptomatology. It is nowadays a well-known fact that general pathology is more or less modified by the paludal poison, as this description will we hope most positively demonstrate.

## ROSEOLA.

Roseola made its appearance shortly before measles, and was mild in all cases. It prevailed among children, especially during the period of dentition, and persons below thirty, whilst above that age it was rather seldom observed.

Its symptoms differed in some respects from those generally noticed in Europe. In the majority of cases the disease began suddenly without any warning, attended with little or no fever. In some the fever was completely absent, in others it was more or less severe, of a remittent character, preceding the rash for from two to eight days, or even ceasing entirely before its appearance. Sometimes the rash on the contrary preceded the fever for a few days. In many cases under our observation both fever and rash were seen to declare themselves simultaneously.

The febrile symptoms were sometimes very severe. They were characterised by headache, heat of skin, furred tongue, and vomiting. No shivers, diarrhœa, or bronchitis were ever observed, but now and then in rare cases a slight cough due to laryngitis. The fever was quite independent of the disease, and no doubt caused by malaria, which intervened as a complication. The temperature generally ranged between 38° C. and 39° C. and in severe cases reached as high as 40° C. or even 41° C. It was reduced by the proper use of quinine, and unlike measles "*fell when the rash appeared.*"

This fever was besides followed by profuse perspiration and a slow pulse, as is often the case after malarial remittent. Its intensity was never in proportion with the degree or extension of the rash.

There were no epistaxis, no prostration, no delirium, and no visceral complications of any kind. The intermittent type was never noticed in our practice with regard to the fever, whilst on the other hand it was not rare for the rash to assume that form. Now and then the face was slightly puffy, with a slight running from the nose and eyes, but never to the same degree as observed in measles. Photophobia was never present.

The rash presented special features on which it is not unnecessary to insist. As above stated it occurred with or without fever, or even preceded the latter. In some cases it was nothing else but a marbled or mottled appearance of the skin. In others it appeared and disappeared to appear again in the same day or in a few hours. In others again it was quite intermittent, and could be seen at a fixed time every day, every other day, or every three days, either in the morning, the middle of the day, or in the evening

It showed itself on all parts of the body, beginning more commonly on the face and thence spreading to the trunk and limbs. This was not however always the case, as it often commenced on the chest, neck, trunk, or even extremities. In several instances it first broke out on the feet, and gradually diffused over the whole body from below upwards. Sometimes again the rash remained limited to one region only, being incomplete in its development, or covered the whole body most rapidly within twenty-four hours. But in the majority of cases the latter course was the one observed.

The rash presented two distinct varieties. It was either a uniform redness, not unlike scarlet fever, or consisted in small dots, slightly elevated above the level of the skin, more or less disseminated at first, and then coalescing so as to form large patches. In both cases the eruption completely disappeared under pressure, and gave rise to itching. It was of a bright or dark red colour, never accompanied with sudamina, and principally more marked on the face, neck, chest, abdomen, and back. It was often also more or less mixed up with the rash of prickly heat, and in slight cases could be distinguished from the latter by means of a magnifying glass.

Long after the fever had subsided, the eruption of roseola was often seen to persist and to be followed by very little desquamation.

Roseola in Mauritius lasts from a few days to a few weeks. Relapses are common, and an attack of it in this epidemic was frequently observed to confer predisposition to measles, especially among infants and children.

## MEASLES.

Like roseola, measles presented in its symptomatology most important modifications and variations.

It attacked as usual those who had not previously suffered children and adults. Babies and infants were equally liable to the disease, whilst it was frequently fatal amongst people of a certain age. All classes of the population, with the exception of Chinamen, were affected by it. It is difficult to explain why the latter escaped the disease—whether they had it before they came to Mauritius, or whether their regular habits or peculiar constitution kept them free from it. It may however be stated as a matter of observation that generally their race is less predisposed than the others to the various diseases met with in our climate.

It was commonly observed, as above mentioned, that roseola predisposed to measles, and it was not unusual for children to suffer from the former first and shortly afterwards from the latter, a remarkable illustration in support of the theory of specificity and of the difference between the two diseases.

Many grown-up people were affected, the symptoms being more or less the same at all ages. It was very severe among the weak and debilitated, and also among those who were at the time labouring under malarial cachexia.

*Incubation.*—The period of incubation, as far as could be ascertained, varied from two to nine days. In several instances, it was easy for us to trace it up in a mathematical way, as the following observations will amply show.

Observation I.—On the 26th of February, 1883, Francis Tom and Joseph Janus were admitted into the wards of the Civil Hospital of Port Louis. On the 28th of February, that is exactly *two days* after, Permal, an Indian, who was a convalescent from malarial fever, had measles. At that very moment there had not been a single case of measles in the Port Louis Hospital, and Permal, whose bed was next Francis Tom's and Joseph Janus's, caught the disease.

Observation II.—On the 11th of April a lady, living in a locality where measles were not at the time prevalent, visited a nephew who was suffering from the disease in its period of desquamation. On the 20th of April, that is *exactly nine days* after, she felt the first symptoms of measles.

Observation III.—A sailor left Mauritius, where his family was suffering from measles. *Exactly seven days after* the disease showed itself on him whilst on board the ship.

*Prodromic Stage.*—There never was any prodromic stage. In almost all cases measles was ushered in by fever accompanied or not by shivering. When this existed, it was found to occur at the beginning and very seldom during the course of the disease. It was besides rarely severe, and only in exceptional cases turned into true rigors. Epistaxis was not common.

*First Stage.*—The fever in the first stage assumed either the remittent or the intermittent types. The skin was hot and dry, the pulse frequent, regular, bounding, or compressible, from 90 to 140. From the very beginning, running from the eyes and nose, sneezing, redness of the eyelids and conjunctivæ, photophobia, dry and barking cough, and dyspnœa were frequently noticed. The face looked puffy and swollen, so much so that at this stage the disease could generally be easily recognised.

Headache was not a predominant symptom. The tongue was covered with a thick white or yellow fur in its centre and red at its tip and edges. The breath was foul, as in intense gastric catarrh. Vomiting was not common, but diarrhœa was sometimes the first phenomenon which attracted the notice of the practitioner.

There was nothing to be observed about the heart, lungs, or liver. Bronchitis was slight when it existed at this period. The spleen was often found more or less enlarged from the effects of malaria, but it never increased in size nor caused any pain during the whole duration of an attack of measles.

The lymphatic glands were often swollen in this stage long before the rash was seen, especially those of the neck and groins.

The temperature was exceedingly interesting to note. It ranged from 37° or 37°·4 C. (minimum) to 40°·4 C. (maximum), the remission or intermission being almost always in the morning, and the acme or fit in the middle of the day or in the evening. In many cases it corresponded with the thermometric cycle as given by Wunderlich, who noticed that in this stage the temperature never attains to its maximum, that its height at this moment enables the practitioner to foresee the maximum to which it will reach in the next stage, and that it is only in the eruptive period that it exhibits its highest degree, exceeding the maximum in the first stage by 0°·8, or 1° C. This is well exemplified by Temp. Chart A, where it will be seen that the highest temperature was in the second stage, and that it was 39°·8 C., when in the first stage the maximum was only 39° C.

Wunderlich's observations however were not always true with regard to the temperature range in our measles, which showed in this respect a remarkable difference from European measles (*vide* Temp. Charts A′, B′, C′).

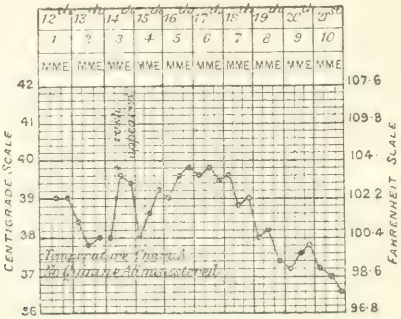
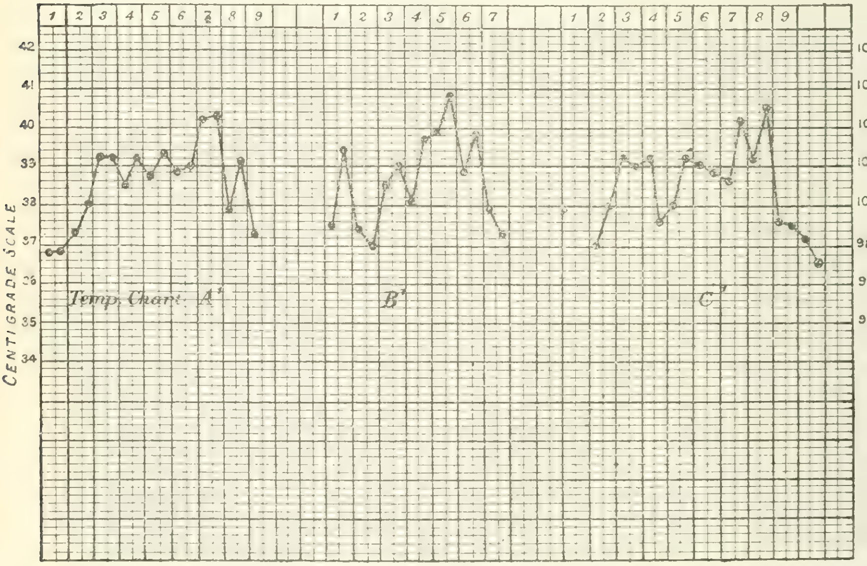


Chart A.

First, the maximum temperature was not always noticed in the second but in the first stage, as can be easily ascertained in



Temp. Chart B, where the highest temperatures were 40°·4 and 40°·2 C. respectively, the former exceeding the latter by 0°·2.

Secondly, the type was frequently intermittent and not remittent, assuming in this stage (first stage) the quotidian, but never the tertian or quartan (*vide* Temp. Chart C).

Thirdly, the difference between the maximum first stage and the maximum second stage was often trifling, and often also considerable (2°).

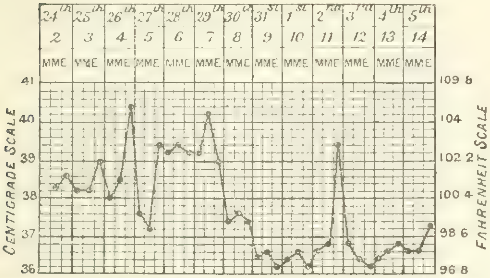


Chart B.

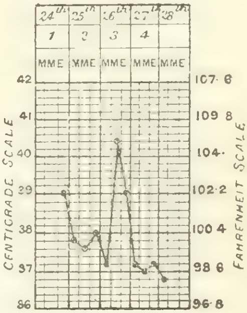


Chart C.

In cases where the type of the fever was quotidian, it was of course difficult to diagnose the disease at the outset when there was a complete absence of the other signs of measles, such as running from the nose and eyes, photophobia, &c.

The first stage lasted from twenty-four hours to ten days. In a very few cases it was completely absent, the eruption appearing at the same time as the fever. It varied in most of our observations from three to five days.

(*To be continued.*)

# Reviews.

*Medical Diagnosis: a Manual of Clinical Methods.* By J. GRAHAM BROWN, M.D., F.R.C.P.E. Crown 8vo, pp. 331. Illustrated. Edinburgh: Bell and Bradfute. 1882.

*Auscultation and Percussion: together with the other Methods of Physical Examination of the Chest.* By SAMUEL GEE, M.D., F.R.C.P., &c. Post 8vo, pp. 344. Illustrated. Third edition. London: Smith, Elder, and Co. 1883.

*How to Examine the Chest, a Practical Guide for the Use of Students.* By SAMUEL WEST, M.D., M.R.C.P., &c. Fcp. 8vo, pp. 200. Illustrated. London: Churchill. 1883.

*The Sphygmograph: its History and Use as an Aid to Diagnosis in Ordinary Practice.* By R. E. DUDGEON, M.D. Fcp. 8vo, pp. 72. Illustrated. London: Baillière. 1882.

*Student's Guide to the Examination of the Pulse and Use of the Sphygmograph.* By BYROM BRAMWELL, M.D., F.R.C.P.E., &c. 8vo, pp. 60. Illustrated. Second edition. Edinburgh: Maclachlan and Stewart. 1883.

ALTHOUGH no text-book can take the place of constant and painstaking practical exercise in physical examination on the part of the student, and although no clinical teacher can follow a strictly systematic order in demonstrating to his pupils the physical signs and symptoms in disease—he must illustrate them simply in the accidental order in which they are offered by chance—yet both student and teacher find the value of a systematic and reasoned text-book to fall back upon at need. Dr. Brown's manual is both systematic and reasoned; it follows the order of case-taking which is current in the wards of the Edinburgh Royal Infirmary; it brings out clearly and concisely the relative value and "perspective" of the various signs; it gives good physico-physiological grounds for most of them, not perplexing the student with conflicting theories, but yet not ignoring their existence; and it touches in some way upon almost every means by which clinical information can be elicited. In some matters, such as the testing of urine for different forms of albumen, the making and measurement of graphic tracings, and the microscopic examination of the blood, its directions are, we think, clearer and simpler than those in any other short clinical manual with which we are acquainted. If the style is somewhat dry, it is mainly because the matter is so condensed; and the student will be thereby less tempted to substitute book-work for ward-work. Dr. Brown has kept himself fully abreast of modern methods, and the practitioner will find in his book much useful information on recent aids to diagnosis.

The new edition of Dr. Gee's model treatise is revised, and altered, and improved. His almost mathematical severity of diction tells with striking effect in the treatment of a subject so largely physical and objective as his. Technical terms are sharply defined and strictly used, the historical bent of the author's mind being evidenced in the preference he gives to old terms in their original meanings. There is scarcely a redundant word in the book, and hence the mastering of it is a most excellent piece of mental training for the student, who will certainly not take in all the meaning of a chapter at a careless glance. A notable point in the new edition is the stress laid on the safety and incomparable value of puncture of the chest in the diagnosis of pleural effusion: if this method were oftener used, and followed up by courageous aspiration, ordinary English practice in cases of moist pleurisy would be more successful than it frequently is at present.

Dr. West's little guide represents the substance of his lectures to beginners in clinical observation, and it is therefore meant to be a simple and concise abstract of the essentials of chest-examination, with a minimum of theoretical explanation or argument. The arrangement is well thought out, and adds much to the perspicuity of the whole subject. The illustrations are unconventional and helpful: but the one illustrating the dulness of pericardial effusion (Fig. 23) is so like another (Fig. 33) which purports to represent a case of mitral stenosis, that the student will do well to doubt that both are typical; we are inclined to question whether either is so. A brief chapter on the examination of the pulse is given; but though this is held to lie within the territory of the chest, the larynx, it seems, is beyond it. The diligent student who has been drilled in Dr. West's book will find it a privilege and a reward to be promoted to the study of Dr. Gee's. The one gives him leading, but the other will give him light.

The monograph of Dr. Dudgeon contains a cursory glance at the history of sphygmography by way of introduction to the description of his own neat little instrument introduced in 1880. We have already noticed the advantages of this sphygmograph (*Practitioner*, xxvii. 384), and need now only say that experience has confirmed our opinion of its handiness, and (when it is sent out in good order by the maker) its trustworthiness for clinical work. The directions given in the little handbook are simple and to the point, and the claims made for the usefulness of pulse-tracing are praiseworthy for their modesty.

Dr. Byrom Bramwell's pamphlet is a revised edition of a lecture delivered in the Edinburgh Extra-academical Medical School. It is a well-illustrated compilation, and discusses the physiological and pathological significance of the different varieties of sphygmograms with knowledge and skill. The instruments supposed to be used are Marey's, Mahomed's, and Dudgeon's. The pamphlet can be recommended as a useful summary of recent researches in the subject.

*The Medical and Surgical History of the War of the Rebellion.* Part III., Vol. II.. "Surgical History." Prepared, under the direction of Joseph K. Barnes, Surgeon-General United States Army, by George A. Otis, Surgeon United States Army, and D. L. Huntingdon, Surgeon United States Army. Washington, 1883.

THIS part—a quarto volume of a thousand pages—completes the surgical history of this great war, and is a work of truly American proportions, constituting the grandest treatise on military surgery ever published. It has been prepared, with enormous labour, by the surgeons above-named, and issued, without stint of means, at the Government Printing Office, Washington. It is full of well-executed wood-cuts, solographs, and plain and coloured lithographs. The details exhibit an admirable organisation and thoroughness in recording the surgical events of the war, so as to enable the collectors to turn to the best account the vast experience it afforded. The volume will remain a monument of the industry, ability, and skill of American surgery, and a work of reference as long as the science exists.

To give an illustration we cite some details given under the heading of "*The Shot-Fractures of the Bones of the Knee-Joint treated by Conservation.*" Of 3,355 shot-fractures of the bones of the knee-joint, 865, or about one-fourth, were treated without operative interference. Of these 338 were successful, 521 fatal; a mortality of 60·6 per cent. In 9 the results were not ascertained. In 59 of the cases of recovery ankylosis was complete, in 165 it was partial; in 23 there was impaired motion, with lameness or weakness of the limb; in 8 the motions of the joint were reported perfect; in 83 the condition of the limb had not been ascertained; in 1 inflammation of the knee-joint was controlled through ligature of the femoral artery; in 2 the same operation was successfully performed for secondary hæmorrhage. In the 521 fatal cases the graver complications were—pyæmia in 77; tetanus in 2; gangrene in 17; erysipelas in 18. In 44 cases, with 24 recoveries and 20 deaths, fragments of the patella, or of the articular ends of the femur, or tibia, were removed.

Under the head of "*Excision of the Knee-Joint for Injury*," we read that the operation was practised in 57 cases, with recovery in 10, death in 44, result not ascertained in 3; a fatality of 81·4 per cent. In 32 of the 57 cases the operation was *primary*, within forty-eight hours of the injury. In 2 of these the result could not be ascertained, in 4 there was recovery, in 26 death resulted, a mortality of 86·6 per cent. In 3 recourse was had to amputation with fatal result in all. In 13 cases the operation of excision was *intermediary*, and in 1 only the operation proved successful. In 7 cases *secondary* excision was performed; in 4 with success, in 3 with fatal result; a mortality of 42·8 per cent. In 5 the excisions were of *uncertain* date, 1 being successful, 3 fatal, and in 1 the result is undetermined.

Then follow the results of *amputation* at the knee-joint, 189 *primary*, with 81 recoveries, 106 deaths, 2 unknown; a mortality of 56·6 per cent.; *intermediary*, 51; a fatality of 68·0 per cent.; *secondary*, 26; fatality, 53·8 per cent.

The conclusion drawn is that "the attempts at conservative surgery in wounds of the knee-joint are not encouraging;" and, "seeing that the cases reserved for conservative treatment were those deemed to have the best chances of a favourable result, the percentage of mortality (60·6 per cent.) must be regarded as very large, and the question naturally arises whether fewer attempts at conservation would not have saved more lives."

A large number of cases are given in detail, and the whole work bears evidence of great care, judgment, and trustworthiness.

# Clinic of the Month.

**Aphasia and Word-Blindness.**—Several recent lectures at the Salpetrière have been devoted by M. Charcot to the study of aphasia, in particular of an interesting and practically uncomplicated case of "word-blindness" (*cécité verbale, Wort-blindheit*). The patient, a man of thirty-seven, had suffered privations and had been long subject to hemicrania. He was suddenly seized with hemiplegia of the right side, with some degree of motor aphasia (Broca's), in which state he stammered, mixed his words (paraphasia), and could not name familiar objects (amnesia). These symptoms passed off, and after four or five months he could speak, write (with the right hand), and walk well. His intellect was generally acute, but he could not read either print or writing. Writing his name he said, *Je sais bien que c'est mon nom que j'écris, mais je ne puis pas le lire.* His field of vision also was destroyed in both eyes to the right of a line drawn vertically through the point of fixation (as occurs in injury to one optic tract). The fundus was normal. The disorder of sight was therefore central. This lesion was not the cause of his peculiar aphasia, for he used without advantage the normal half of his field. Though unable to read at sight, he could do so when guided by forming the letters in writing, *i.e.* by his muscular sense. Print was more difficult to read than writing, for want of this means of guidance. But if allowed to form the letters of a word he would at once read it aloud with closed eyes. Practice in reading much improved his power in this respect, and as his mental perception of letters improved his field of vision increased. M. Charcot explained the probable pathology in this way—the diseased area in such cases, as fairly proved by three necropsies, was that formed by the supramarginal lobule and angular gyrus of the parietal lobe, and the first convolution of the temporal. Hemianopsy had been found to be associated with disease of the cortex in the same area. This therefore was the region affected in the patient. The malady had probably begun with plugging by embolism of the main trunk of the sylvian artery (resulting in amnesia, motor aphasia, hemiplegia, word-blindness). The clot had afterwards disintegrated, but ischaemia still persisted in the parietal area, and was the cause of the word-blindness. The improvement under treatment was very unusual. Another case contrasted with the preceding was one of true motor aphasia, doubtless due to disease in Broca's frontal convolution. This began with right hemiplegia, with loss of all understanding of spoken words (*surdité des mots, Worttaubheit*), and when this passed off, inability to read words which he saw and understood when read to him (*Wortblindheit*). There was no paralysis of lips and tongue. The hemiplegia passed off, his mind became active, he became able to read, write, calculate, and understand speech, but could not pronounce any but the shortest words. He had lost the memory of the muscular movements necessary for pronunciation. (*Progrès médical*, June 9, 16, 23, July 7, 1883.)

**Muscular Atrophy in Rheumatism of the Joints.**—Dr. Luigi Petrone has collected a few cases in which muscular atrophy accompanied or followed immediately upon rheumatic inflammation of the larger joints, especially of the shoulder and knee. The deltoid and triceps suffered especially. The atrophy showed itself about the beginning of the second week after the articular pain; sometimes there seemed to him more loss of power than atrophy, sometimes the reverse. Similar muscular atrophy was noticed by M. Valtat after traumatic injury of the joints (*Archives générales*, 1879, p. 159); in some cases occurring more rapidly, even within twenty-four hours of the injury. This led Dr. Petrone to a series of experiments consisting in the artificial induction of acute synovitis in animals. He found on post-mortem examination within ten or twelve days of the experiments that the muscles in the neighbourhood of the inflamed joint had lost ten to thirty per cent. of their weight. The nerves showed nothing abnormal. He does not pretend to determine the method of the influence of the joint-affection on the surrounding muscles, but urges that the effects are too rapid to be explained either by the atrophy of disuse, or by Vulpian's hypothesis (*Leçons sur l'Appareil vasomoteur*, vol. ii.) that the irritation of the articular nerve produces an effect on the grey matter of the spinal cord which leads to the muscular atrophy. (*Lo Sperimentale*, May 1883.)

**Ichthyosis in Tabes.**—In the *Progrès médical* (No. 20, 1883), MM. Ballet and Dutil give a short description of an ichthyotic condition of the skin which they have had occasion to observe in tabes, and which they regard as an essential part of the disease, and not as a mere coincidence. Compared with this, the lesions hitherto described—*e.g.* herpetic eruptions, ecchymoses, perforating ulcer, &c.—are to be regarded as mere transitory occurrences. The ichthyosis is slowly developed, probably progressive, and seems to be analogous to the now well-known osseous lesions. The lesion, when present, is always found at those situations in which there has been previously some marked disturbance of sensation, either anæsthesia, or hyperæsthesia, or lightning pains. The limbs, and especially the arms, would seem to be the parts most frequently affected. The falling off or alteration of the nails, which has already been described, would seem to be merely a particular example of this same lesion. Disorders of nutrition such as the one under consideration accord very well with the idea of a peripheral lesion, such as Pierret was the first to recognise. (*Med. Times.*)

**The Distoma Hæmatobium in the Urinary Passages and Large Intestines.**—Dr. Zancarol, Physician in Chief of the Greek Hospital at Alexandria, has recently presented a memoir to the Medical Society of the Hospitals of Paris on this subject. The *Distoma* (*Bilharzia*) *hæmatobium* is a trematode of separate sexes. The male is cylindrical, measuring about ·4 inch in length, and possesses a cavity into which the female is received during the act of fecundation. The female is longer than the male by about ·2 inch, is thinner and more filiform. The ordinary habitat of the trematode is the blood of the portal vein, the mesenteric, vesical, and hæmorrhoidal veins. The male is provided with two suctorial appliances which enable it to fasten itself to the walls of the blood-vessel. The existence of the eggs and embryos of the parasite in the urine, which becomes bloody from alteration of the vesical mucous membrane, and their more rare presence in the fæcal matters, is the means of determining their presence in the system. The presence of eggs in the substance of the tissues shows grave pathological lesions. Zancarol presented two specimens showing this, from two patients. One died with symptoms of chronic intestinal ulceration. The autopsy showed that the walls of the descending colon, the sigmoid flexure and the rectum, were thickened and enlarged almost entirely at the expense of the mucous coat. The internal surface was converted into a mass of vegetations having the appearance of hæmorrhoids. These vegetations run from ·4 to ·6 of an inch high, with a very enlarged base. In the intervals the surface is sometimes granular, sometimes smooth. In some cases the vegetative and granular forms are united. These lesions are due to infiltration of the mucous membrane by the eggs of the distoma, and if a microscopic examination be made of the submucous layer, it is seen to be full of the eggs, the same being true of the tubular glands. The eggs are ovoid, shaped like a pumpkin seed, about 0·170 mm. long, and often present a lateral spine, which is only found in the eggs of the intestinal tunics. In the urinary apparatus this spine is at one extremity of the egg. The eggs are undoubtedly laid in the hæmorrhoidal veins, for it is here that the adults of both sexes are found. The mechanism of their passage through the walls of the vessels into the tissues is unexplained. The second specimen presented was from a man dead of uræmia, in whose urine the eggs had been found during life. The kidneys were much enlarged, surfaces wrinkled, containing cystic cavities, and the distinction between the cortical and medullary substance had disappeared; the renal structure was composed solely of an homogeneous layer, and was indurated. Some small pisiform abscesses were found in them. The ureters were enlarged and tortuous, the walls considerably thickened, the internal surface velvety. The walls of the bladder were enormously hypertrophied, and 1·2 inch thick, the cavity being about the size of a walnut. The hypertrophy was mostly at the expense of the muscular layer, which was very hard. Microscopic examination showed that the eggs existed in small quantity in the superficial layer of the vesical mucous membrane, the epithelium having disappeared. The right kidney presented the ordinary lesions of hydronephrosis, the left those of advanced interstitial nephritis. The patient, then, had had cystitis caused by the eggs of the Distoma, and this affection caused the lesions of the ureters and kidneys; for the eggs were not found in the kidneys in this case, and are so found only exceptionally. The disease is not always fatal, as has been stated in certain works on the subject; as evidences of it are found in a great number of Arabs, some of whom recover. (*Journal de Méd. de Paris,* May 19, 1883.)

**A Case of Progressive Total Hemiatrophia.**—Dr. Henschen, of Upsala, relates in a recent number of the *Nordiskt Medicinskt Arkiv* a case which is almost unique in medical literature—presenting, as it does, a series of atrophic changes of half of the body, in the skin and subcutaneous tissue as well as in the muscles, bones, and joints, principally in the face, the left arm, the left leg, and partly the left half of the trunk. The patient is still living, and therefore the pathological changes cannot be defined with any accuracy; but the appearances of the body, which are represented in a plate accompanying the paper, are very striking, showing an extreme degree of emaciation of the left arm and leg, and an appearance of the face almost identical with that seen in progressive facial hemiatrophia. The cranium above the eyebrows is nearly symmetrical, but on the plane below them the face exhibits a most marked asymmetry, the left half being considerably smaller than the right. The nose is, as it were, pushed towards the left; the left cheek is deeply sunken, destitute of fat, and surrounded with deep radiating wrinkles; the eye is very much sunken, but otherwise healthy; the eyelids deprived of their fat; the left zygomatic arch atrophied, as well as the soft parts surrounding this bony process. The skin and the lips of the left side are very thin; the upper and lower maxillary bones of this side are much atrophied. The teeth have been shed; the alveolar process of the left upper maxillary bone is wanting behind the second molar tooth, and the raphe of the palate is drawn to the left. All the right side of the face is healthy, with abundant fat. The neck is symmetrical. All the left half of the trunk is rather smaller than the right, but, with this exception, it is nearly alike, though some of the parts are atrophied. Over these atrophied parts the skin is as thin as paper, and the subcutaneous fat is almost entirely wanting, so that the muscular fibres form evident projections on the skin. The left arm and leg are remarkably atrophied, the fat being almost completely absent, the skin very thin, the muscles wasted, the joints altered in character, and some of the bones united together,—as, for instance, the tibia and fibula,—and the tibio-tarsal joint is ankylosed. The tactile sensibility of the atrophied parts is not remarkably altered, except that the left leg is more sensitive than the right, being more easily affected by cold, and perhaps also by electric irritation. The patient, who is now forty-six years old, was healthy up to the age of fourteen, when he suffered from a slight sprain of the left ankle-joint, and shortly afterwards he had an erysipelatous inflammation of the left leg. Since that time he suffered from pricking and shooting in the left half of the body, and at the end of three months some changes appeared in the extremities and the trunk, and, six months later, in the face. At this time he suffered from severe attacks of headache. At nineteen years of age he had melancholia, but he recovered, and now enjoys good health. He married at the age of forty, and had a healthy and well-formed child. All the changes above described first appeared, therefore, a short time after a sprain of the left ankle-joint. They have continued since that period, and the morbid process went on ascending to the central nervous system, the anatomico-pathological process being at present unknown, as well as the course which it has followed in the nervous centres. (*Med. Times and Gaz.* Aug. 4, 1883.)

**Repair of Fractures in Diabetes.**—Prof. Verneuil, having related to the Académie de Médecine (*Bulletin*, July 24) some cases of fracture with defective union in diabetes (in continuation of former communications on the relations which exist between traumatic injuries and general diseases), concludes as follows:—(1) The delay or absence of consolidation in these three cases of fracture would seem to be referable to the dyscrasia recognised to exist in diabetes. (2) This delay or absence of consolidation necessary implies a delay or suppression of reparatory power, a special form of mal-nutrition. (3) Whence we may conclude that diabetes, when it impedes or prevents the formation of callus, leads to, if it even does not directly cause, the diminution or suppression of nutrition. (*Med. Times and Gaz.*)

**Nucleated Red Corpuscles in Anæmia.**—Hayem (like Cohnheim, Litten, Erb, and others) has found nucleated red corpuscles in the blood of six anæmic patients, two suffering from gastric cancer, one from pernicious anæmia, one from post-puerperal anæmia, and three from leukæmia. The nucleated corpuscles were always few (two or three in several thousand), and were not detected in fresh blood, but only after various methods of preparation. Some of them resembled fœtal blood-corpuscles, others were like the cellular elements of the fœtal bone-marrow or spleen-pulp. (*Archives de Physiologie,* 3, 1883.)

**Peculiarities of an Epidemic of Measles.**—Dr. J. Fewsmith makes the following abstract from Demme's article in the *Jahrbuch für Kinderheilkunde*, Band xix., Heft 2:—Out of 224 cases of measles there were thirteen deaths. Twice death was caused by the violence of the poison and the excessive fever on the second day. The duration of incubation averaged ten to twelve days, but in a few cases was only three days. There were some noticeable cases of transitory and hereditary immunity from the disease. The epidemic in Berne began at a time when there was much scarlatina present, and Demme noticed in all the cases of measles a very pronounced *angina initialis,* and repeatedly measles was rapidly followed by scarlet fever in the same person. A girl suffering from chorea was attacked, and a boy nine years old with obstinate prurigo; the former was freed from her chorea, and the latter from his prurigo. In some cases there was an excessively high temperature with the eruption; two cases with respective temperatures of 42°·3 C. and 42°·6 C. recovered, while two with temperatures of 42°·7 C. and 42°·9 C. proved fatal. In three cases there was no fever during the whole course of the disease, and in one case the temperature was subnormal. In four cases there was acute pericarditis, and in three cases acute endocarditis. Moreover there were some cases of glomerulo-nephritis in the desquamative stage of undoubted measles, once even with uræmic symptoms. There were two cases of complicating gangrene, one of the vulva, and one of the lower jaw, both ending in recovery. (*Amer. Journ. of Obstetrics,* May 1883.)

**Diagnosis of the Different Forms of Urethral Discharge.**—Dr. Furbinger thus distinguishes the different discharges taking place from the male urethra. Spermatorrhœa is a loss of seminal fluid which occurs during defæcation or at the end of micturition. The condition, which is much more common than is ordinarily supposed, is not a final stage of pollution, but is caused most frequently by gonorrhœa and sexual abuses. Spermatorrhœa becomes azoöspermatorrhœa when for any cause (usually from epididymitis) the testicles cease to produce spermatozoa. Prostatorrhœa is the discharge, sometimes continuous, sometimes only during defæcation and urination, of the prostatic secretion. It is a rare condition, and is a symptom of chronic prostatitis, usually of gonorrhœal origin. Urethrorrhœa *ex libidine* is a phenomenon occurring usually in anæmic and nervous individuals. It consists of a scanty discharge, without orgasm or ejaculation, accompanied by intense sexual excitement and strong erection. The last discharge to be considered is gleet. Of these five processes two are easily recognised. Spermatorrhœa is evidenced by the presence in large numbers of spermatozoa (a few here and there signify nothing), and urethrorrhœa is readily recognised by its characteristic mode of onset. The secretion of the latter is the product of the urethral glands and Cowper's glands. It is clear, stringy, and contains but few epithelial and round cells. A very abundant discharge points to azoöspermatorrhœa. The absence of pus-corpuscles also points to the same condition, though their presence has no weight on the other side, as urethritis may exist at the same time. In such cases the presence of the specific secretion of the seminal vesicles must be determined. If one finds a jelly-like substance resembling in shape grains of sago, that is conclusive; but if this is not found, it may be that it is in solution, and may then be precipitated by a strong alkali. The secretion is allowed to stand for a time, and then a clear drop is placed in a watch-glass, and a drop of caustic potash added. If now the drop shows a thick white cloud, or streaks, it is evidence that the secretion contains seminal fluid. If this process shows that we have not to do with azoöspermatorrhœa, there still remains the differential diagnosis between prostatorrhœa and gleet to be made. In the latter the discharge is very scanty; in the former, digital examination reveals great tenderness on pressure of the prostate gland. Indications of prostatorrhœa are: (1) the presence, unfortunately not constant, of numerous amyloid bodies; (2) numerous typical cylindrical cells, showing the double layer arrangement of glandular epithelium; (3) the large Böttcher's crystals. The presence of the latter is ascertained by mixing a drop of the secretion with a drop of a 1 per cent. solution of phosphorated ammonia upon an object glass. In about an hour numerous large, exceedingly beautiful crystals are formed. The secretion of the prostate, the author insists, is not clear, odourless, and thick, as usually stated, but is thin, of a milky cloudiness, and possesses the characteristic odour of spermatic fluid. An aid to diagnosis is also found in the time of the appearance of the secretion in the urine. The first and last portions are to be separated from the principal flow of the urine. The presence of the secretion in the first portion points to gleet; in the first and second portions to prostatorrhœa; in the third portion to azoöspermatorrhœa. The secretion in the latter appears in the form of nearly transparent, thick, stringy masses, and sometimes also in the shape of sago grains. (*Centralb. für klin. Medicin*, April 21, 1883.)

**Treatment of Peliosis Rheumatica.**—Dr. McCall Anderson, in a lecture delivered by him at the University of Glasgow, on the affection termed peliosis or purpura rheumatica, says: The disease is generally met with in young persons under thirty, and in those who have apparently been previously in good health. The disease is characterised by pains in the joints, with swelling and slight fever. After a few days, a crop of hæmorrhagic spots comes out, and they pass through the same stages as in a black eye. The disease is often kept up, owing to the development of successive crops of spots, each crop being accompanied by a recurrence of the fever and joint-affection. The whole duration of the disease may be from weeks to months, or rarely even years. Sometimes the spots may be mistaken for scurvy; but the previous diet of the patient, together with the state of the gums and the absence of anæmic pallor, will help one to diagnose the affection. Sometimes the disease is complicated with the development of bullæ, and a case illustrating this complication is noted. The extravasations of blood are sometimes preceded by little solid elevations or papules, so that the disease seems to correspond with the eruption described by Willan as "lichen lividus." In the treatment of this affection, great attention must be paid to the general health and to the digestive organs. When this has been done and the affection persists, a course of turpentine may be tried, in doses of ten to thirty minims three times a day, or of liquid extract of ergot (in doses of half a drachm every four hours), on the principle of contracting the small blood-vessels of the skin. In chronic cases, arsenic may be tried with benefit. From this it may be seen that Dr. Anderson does not agree with Hebra, who wrote: "We have no means either of shortening its course, or of preventing the possibility of its ending in death." (*Brit. Med. Journ.*, June 9, 1883.)

**Salicylate Treatment of Rheumatism.**—Dr. Isambard Owen, in an elaborate statistical inquiry into the results obtained in St. George's Hospital in 1877 and 1878 by the use of salicylates in rheumatism, arrives at the following results: (1) The duration of pain and fever after the beginning of treatment would appear to be independent both of the character of the cases (so far as defined by the range of temperature) and of their previous duration. (2) The duration of the primary attack does not appear to be affected by the amount of the initial doses of salicylate (within the limits given, viz. 1½ to 3 drachms in the 24 hours), or by the combination of full doses of alkali with the drug. (3) The duration of the primary attack after the commencement of treatment was only about half as long as under full doses of alkali. (4) In administering the salicylates an advantage is gained in shortening the total duration of the case (*i.e.* until convalesence is established) by restricting the initial doses and by combining with them full doses of alkali. (5) In respect of actual suffering salicylate treatment showed a marked advantage when compared with alkaline treatment; the advantage was least marked where the salicylate was given in large initial doses without alkali, and hardly more so where the salicylate was given only in small doses; the advantage was more marked for the salicylate in moderate initial doses, and most marked of all where the salicylate was given either in large or moderate initial doses combined with full doses of alkali. In the two latter cases the total duration of suffering averaged hardly more than half that shown in the cases treated by alkali alone. (6) Summing up, the greatest aggregate of advantage is derived from a combination of salicylate and alkaline treatment, the salicylate (of sodium) being given in doses equivalent at the outset to two drachms in the 24 hours, and reduced as occasion requires. The alkaline treatment referred to consisted in the administration of doses of potassæ bicarbonas, or potassæ citras, of sufficient amount to render the urine alkaline. The salicylate was that prepared from carbolic acid. (*The Treatment of Acute Rheumatism.* Churchill: 1883.)

**Nerve-lesions in Cardiac Hypertrophy.**—From observations on the condition of the nerves of the heart in cases of hypertrophy, Dr. Uskow finds that the nerves lose their medulla and exhibit proliferation of their nuclei. When acute disease now supervenes, the alterations in the nerve pass into acute parenchymatous inflammation. The changes both in the nerve-cells which are found in the course of the fibres, and in those which form the ganglia in the septum between the auricles, are limited to thickening of their capsules and proliferation of the nuclei; the protoplasm of the nerve-cells never exhibits any perceptible alteration. (*Virchow's Archiv*, vol. 92, March 1883.)

**Pathology of Œdema of the Lungs.**—The experiments of Cohnheim and his pupils have shown that in all probability œdema of the lungs is due to imperfect action of the left ventricle while the right is still functionally active, so that the obstruction to the pulmonary circulation is very great. Dr. Falk gives two cases of injury to the heart in man which support Cohnheim's theory. In one, the left ventricle of a young man was penetrated by a shot, and the substance of the ventricular wall became engorged with blood. In this case the lungs were very œdematous. In another case, where the right ventricle was burst by a blow on the thorax from the buffer of a railway waggon, no trace of œdema was found in the lungs. (*Virchow's Archiv*, vol. 92, March 1883.)

**Affections of the Feet in Locomotor Ataxy.**—MM. Charcot and Féré have described under the term "tabetic foot" a morbid condition of the bones and joints of the feet in tabes dorsalis, similar to that which occurs in the large joints and bones in the same disease and sometimes associated with it. This state consists in an osseous thickening at the inner side of the foot, commonly best marked over the tarso-metatarsal joint of the great toe, and presenting a marked projection upwards or downwards. Sometimes it extends over the inner side of the scaphoid and internal cuneiform bones, and is found also at the metatarso-phalangeal joints of the other toes. Sometimes there is a history of pain at the affected part, but not infrequently the disease seems to have developed without causing distress, without evidence of inflammation, and unattended by the symptom of crackling. In each of three illustrative cases the ataxy was of long standing. (A similar deformity of foot was described at the International Congress in London by Dr. H. W. Page.) Specimens from a case of this kind showed the following appearances:—All the bones of the tarsus and metatarsus were spongy, friable, and lighter than normal. The upper surface of the astragalus was cracked across, the articular surfaces of the astragalus and calcaneum were eroded and roughened by bony vegetations, the scaphoid and cuboid deformed and worn-looking, also the internal cuneiform thickened vertically and ankylosed to the first metatarsal, the second cuneiform was similarly ankylosed to its metatarsal, the third cuneiform was in fragments. No traumatic or suppurative lesion having existed, the above changes were regarded by MM. Charcot and Féré as the result of the ataxy. (*Progrès médical*, Aug. 4, 1883.)

**The Relation between the Fluid Absorbed and Urine Excreted in Scarlatina.**—According to Professor Glax there are three distinct forms of relation between the fluid absorbed and the urine excreted in scarlet fever. The quantity of urine is diminished only while the fever lasts, it then gradually rises to the normal or exceeds it for several days. In this form the course is very favourable notwithstanding the high temperature at commencement. Secondly, the diuresis increases immediately after the cessation of the fever, but in the next few days sinks greatly, and during the whole course exhibits enormous variations. This course is not favourable when the patients become anæmic; œdema may occur, but the urine remains free from albumen. In the third form, the excretion of urine, which was diminished during the fever, during defervescence rises quickly to the normal or over it, and remains so for several days as in the first form. It then sinks rapidly and remains low until death; or after several days a copious flow of urine takes place which sinks gradually to the normal. To this class all cases belong, in which, after an apparently normal course at first, nephritis and dropsy occur. In these cases a diminution of the urine is frequently the first sign of subsequent complications before any albumen has appeared in the urine, or before any trace of œdema is observable. This is of considerable practical importance, as a careful observation of the body-weight and quantity of urine shows that increase in the weight of the body and coincident decrease in the quantity of urine indicates the approach of complications. These may be averted or greatly diminished by restricting the quantity of fluid absorbed, for generally it is observed that the diuresis increases as soon as the quantity of fluid ingested is reduced. The reason for this appears to be that the weakened heart is unable to cope with any large quantity of blood, and the rapidity of circulation necessary for the secretion of urine is not attained. The author considers also that the convulsions in scarlet fever are chiefly due to œdema of the brain. (*Archiv für exper. Path. und Pharm.*, p. 200, vol. xxxiii.)

**Tannate of Sodium in Chronic Nephritis.**—Tannate of sodium has been recommended by Lewin instead of tannin in albuminuria in order to lessen the excretion of albumen. It has been tried by Ribbert on animals. Ribbert ligatured the renal artery in rabbits for an hour and a half and produced albuminuria. He then injected a one-half per cent. solution of tannin into the jugular vein, extirpated the kidney, and examined it microscopically. He found that much less albumen occurred in the glomeruli when tannin was employed, showing that it had lessened the excretion of albumen. A similar result was obtained with tannate of sodium, and in his experiments with this substance the albumen was generally completely absent from the glomeruli. Dr. Briese has tried the tannate of sodium upon patients suffering from chronic albuminuria. He finds that some patients bear it well, and can take it for a month without any disagreeable consequences, while others vomit after every dose, and in others again the stomach and intestine are affected in two or three days. In the four carefully observed cases which he records the tannate of sodium was of no use whatever. It did not lessen the quantity of albumen excreted, nor did it alter the course of the disease. (*Deut. Arch. f. klin. Med.*, p. 220, vol. xxxiii.)

**Bilious Pneumonia.**—Traube distinguished bilious pneumonia as characterised by disturbance of digestion, a thick yellow coat on the tongue, grass-green sputa, vomiting, delirium, stupor, absence of cough or pain in the side from dulness of the sensorium, severe and prolonged course, and intolerance of venesection. Oppolzer and Lebert, on the other hand, held that bilious is distinguished from non-bilious pneumonia only by the discoloration of the skin and the marked gastric disorder and slowness of the pulse. Bettelheim considers that in all probability the diseases spoken of under the same name by these authors are different. He proposes to retain the name bilious pneumonia for the disease described by Traube, and to give the name of *pneumonia cum ictero* to that described by Oppolzer. He himself has not seen a case of the disease described by Traube. These cases of *pneumonia cum ictero* are characterised by (1) having the same course and termination as non-bilious pneumonia, being distinguished only by the discoloration, the gastric symptoms, and the relative infrequency of the pulse; (2) all other grave symptoms of the action of biliary acids on the brain and heart, such as stupor, nervous disturbances, or excessive disturbance of the general condition are absent; and (3) venesection is borne quite as well as in ordinary pneumonia. (*Deut. Arch. f. klin. Med.*, p. 591, vol. xxxii.)

# Extracts from British and Foreign Journals.

**Action of Alkalies on the Bile.**—A number of experiments have been made by Lewaschew and Klikowitsch, on the action of mineral waters and alkaline salts on the bile. The experiments were made upon dogs, and, in order to render the conditions as nearly as possible like those of clinical experiment, they employed animals with permanent biliary fistulæ in which the bile-duct was not ligatured. No canula was kept in the fistula, which was only prevented from entirely closing by the occasional introduction of a bougie. During the experiment a tube was passed into the gall-bladder through the fistula, and the bile was thus collected. In the intervals between the experiments the lips of the fistula closed together and retained the bile, so that the animal might be said to be in a perfectly normal condition. Before each experiment the animal fasted entirely for twenty-four hours. The mineral waters with which they experimented were Vichy, Carlsbad, and a Russian mineral water from the Caucasus named Essentowky. The chief constituents of these waters are bicarbonate of sodium and sulphate of sodium ; the authors also experimented with artificial solutions of these salts. The action of all of the waters is of a double kind : they increase the quantity of the bile and render it more fluid and watery ; immediately after introduction they cause a slight diminution in the quantity of bile, but this is only transient and is succeeded by a marked increase. The transient fall in the quantity secreted was probably due to a greater quantity of bile flowing into the intestinal canal. Such a flow will be beneficial in clearing out any bile stagnating in the gall-bladder. The subsequent increase in the quantity of bile issuing from the fistula indicates a greater flow of bile into the gall-bladder, and this also will be of service in emptying out any stagnant bile, and restoring the normal condition when this is disturbed. Artificial solutions of alkaline salts have a similar action to the natural mineral waters, and, as with them, the action varies according to the concentration of the solution. Bicarbonate of sodium has a quicker, more powerful, and more lasting effect on the composition of the bile than the sulphate of sodium, and weak solutions up to a certain point act more powerfully than strong solutions. Consequently, those mineral waters act most powerfully on the composition of the bile which contain bicarbonate of sodium in small quantities, like Vichy. Those waters which, like Carlsbad, chiefly contain sulphate of sodium, are less powerful, as are also more concentrated waters, like Essentowky. On comparing the action of mineral waters with simple hot water, the authors found that the action of both Carlsbad water and Essentowky water was much the same as that of simple hot water, but that the action of the Vichy water was much more marked, causing the bile to become much more fluid, and to remain so for a much longer time. The temperature of the water has a very marked effect upon its action. When it is warm its action not only becomes quicker, which is perhaps due to quicker absorption from the stomach, but is much greater and causes the alterations in the bile to be not only greater but to last for a longer time. When other mineral waters or artificial solutions of alkaline salts are employed (in order to render the bile more fluid), the same effect can be produced by a much smaller quantity of the remedy if it is used hot, a fact which is sometimes of very considerable practical importance. (*Archiv f. exper. Path. und Pharm.* vol. xxxiii.)

**Cerebral Hæmorrhage in Purpura Hæmorrhagica.**—Dr. Duplaix terminates a paper, published in the *Archives Générales* for April and May, with the following conclusions:—"(1) There exist in the course of purpura hæmorrhagica certain cerebral disturbances which are of frequent occurrence, and which depend upon cerebral lesions. (2) These cerebral disturbances are very variable in their intensity. Sometimes they are scarcely marked and pass unperceived, while at others they are sufficiently violent to prove fatal. (3) They are due to certain modifications in the condition of the nervous centres, most frequently to cerebral anæmia, but there are cases in which hæmorrhages give rise to them. (4) These hæmorrhages are most often of but slight extent. They affect sometimes the meninges and sometimes the cerebral substance, and oftentimes both the meninges and the brain. (5) True hæmorrhagic centres may exist without any fixed seat, the consequences of which are the same as those of ordinary cerebral hæmorrhage. (6) The hæmorrhages, whatever may be their extent, are very rare, and this rarity is explained by the complete cerebral anæmia which exists in most of these patients. (7) Their pathogeny does not differ from that of hæmorrhages of other organs, but we must take into account the conditions of the circulation and of the vascular changes which have been described, especially in the cases in which intense lesions have been slow of production in debilitated subjects. (8) The clinical manifestations have been very variable, and in relation to the extent and intensity of the lesions; nevertheless, there are cases in which, in spite of the existence of lesions, no symptom has been observed during life, and others in which anæmia has been the sole lesion observed in patients who have presented marked symptoms. The localised lesions are the only ones which have well-defined symptoms. (9) The diagnosis is difficult in most cases, and hæmorrhage should be suspected always, notwithstanding the more frequent occurrence of anæmia. The prognosis is directly proportionate to the intensity of the nervous lesions." (*Med. Times and Gaz.*, Aug. 4, 1883.)

**Fœtid Feet.**—M. Vieusse, principal medical officer at the Military Hospital at Oran, states that excessive sweating of the feet, under whatever form it appears (whether as mere supersecretion accompanied by severe pain, or with fœtidity), can be quickly cured by carefully conducted frictions with the subnitrate of bismuth; and even in the few cases where this suppresses the abundant sweating only temporarily, it still removes the severe pain and the fœtidity which often accompany the secretion. He has never found any ill consequences follow the suppression of the sweating. (*Gaz. Hebdomadaire*, July 27, 1883.)

**Painless Treatment of Condylomata.**—Dr. Nussbaum recommends the treatment of small condylomatous patches on the penis by daily washings with salt solution followed by the sprinkling over them of calomel powder. Chemical change takes place and corrosive sublimate is produced; the condylomata disappear, and no pain is felt. Solution of corrosive sublimate in collodion, which acts more quickly, gives rise to much pain, and requires the patient to rest in bed. The proposed method is not new, but has fallen into unmerited disuse. (*Münchner ärztl. Intelligenzbl.*, 1882.)

**Carbolic Acid as a Local Anæsthetic and Mouth-Wash.**—Dr. Squibb says: Carbolic acid and other phenols with which it is associated are all very effective local anæsthetics, and this therapeutic relation is far too much overlooked or neglected. A paper by Dr. J. H. Bill, of the United States army, published in the *American Journ. of Med. Sciences* for 1870, page 573, first drew attention strongly to this point, and every one who has handled the acid much has amply confirmed Dr. Bill's experience, and yet the matter has been but imperfectly followed up. Even its application to the pain of burns, erysipelas, and other superficial affections, though often insisted upon, is not generally adopted, and when adopted it is rarely in the best way, The writer knows from personal experience, and from extensive practice in his laboratory where burns and scalds are not unfrequent, that a solution containing from one-half to 1 per cent. applied by means of thin cloths, frequently renewed, will relieve the pain of burns within ten minutes; and the relief will be permanent if the application be continued during the twenty-four or forty-eight hours of primary irritation. Under such dressing the burns, if superficial, will not suppurate, and if deeper, the suppuration will be greatly diminished and modified. If the solution be applied too strong, it will at first increase the pain for a very short time; but the after-effects are less favourable, as the irritation of too much of the acid increases the tendency to suppuration. A simple rule for guidance is that the renewal of the application should not cause smarting or renewal of the pain. The anæsthetic effect upon the acute suffering of burns and scalds is very remarkable. A 5 per cent. solution of the liquefied acid is a very convenient preparation to keep in readiness for making the more dilute solutions needed for burns, erysipelas, &c., and for such uses as protecting hypodermic solutions. One-twentieth of such a solution is quite sufficient to prevent the growth of micro-organisms in any preparation which needs protecting. It is simply to be added in making up the preparation to the required measure. A piece of paper moistened with a few drops of such a solution and kept in extract-pots, &c., will prevent the growth of mould. Such a solution diluted so as to be not stronger than 1 per cent., nor weaker than about one-half per cent., makes an excellent tooth and mouth wash for use in the morning. Habitually used, it in some degree checks the deposition of "tartar" on the teeth, keeps the tooth-brush sweet and clean, and there is nothing that leaves the mucous surfaces in so clean and pleasant a condition for the first meal of the day. A bottle of the 5 per cent. solution may be placed upon the washstand, and a couple of teaspoonfuls poured into the mug, diluted with four or five times as much water, stirred with the tooth-brush and then used upon the brush; the mouth being finally rinsed out with the remainder of the solution. This is a very good habit, which has been followed by the writer and many others for many years with advantage. (*Ephemeris*, May 1883.)

**The Diseases of Parasites.**—Dr. Manson, in an article entitled "The Intimate Pathology of Filaria Disease," says that "there is abundant evidence that *Filaria sanguinis hominis* does not always, or even generally, give rise to disease. As a rule, parasite and host live together for years in perfect harmony." In answer to the questions, What are the conditions that determine lymphatic obstruction in filarial disease? What is the link between the mature parasite and elephantiasis? How comes it that, in but one subject out of many, serious disease is the result of the presence of such a tenant? Dr. Manson argues that the mother filaria—residing, let us say, in the lymphatics of the scrotum—whilst naturally viviparous, occasionally aborts. Now, as the embryo filaria born at full time can easily pass through the smallest vessels, whilst the premature embryo is too large to traverse the neighbouring lymphatic glands into which the current sweeps it, the result is that the miniature brood plugs the lymphatics all round the spot where the mother lies, and distension occurs behind the seat of arrested flow, producing lymph-scrotum. It thus appears that certain diseases in man may be due not to the mere presence of parasites within him, but to processes of disease or disorder in the parasites themselves. (*Med. Times and Gaz.*, Feb. 1883.)

**Diphtheritic Nephritis.**—According to Professor Fürbringer cases of pure diphtheritic nephritis without passive congestion may be divided into three classes: First, kidneys which appear normal to the naked eye with an anæmic cortex. In these the essential and almost the only histological change is parenchymatous degeneration of the epithelium in the cortical tubules. This is an abortive form closely allied to the febrile kidney. In the second form the cortex of the kidney appears slightly increased, and is pale and turbid-looking on section. The degeneration of the cells in this form is both more intense and more extensive, and extends to the epithelial covering of the glomeruli. Alterations of the interstitial substance are beginning; the medullary tubules are sometimes catarrhal; there are no vascular lesions. The third form is the large yellow kidney, a form which is parallel to the hæmorrhagic kidney of scarlet fever. In this form there is extensive fatty degeneration of the parenchyma and well marked alterations of the stroma. (*Virchow's Archiv*, vol. 92, March 1883.)

**Inoculability of Leprosy in Animals.**—Dr. Otto Damsch has made a number of experiments on the inoculation of leprous material in animals. The results seem to show positively that leprosy can be communicated to animals. Portions of leprous tissue may remain for months in the animal body without the nuclei of the cells or the bacilli contained in them losing their power of absorbing colouring matter and becoming stained; and the bacilli may not only remain intact for as much as four to seven months in the bodies of cats or rabbits, but they may actually multiply. His experiments show further that, where the bacilli penetrate, processes occur which are analogous to the leprous processes in man, not only histologically but also in their progressive character and in their tendency to infect neighbouring tissues. (*Virchow's Archiv*, vol. 92, April 1883.)

**Relation of the Nervous System to Diseases of the Vessels and Aneurisms.**—Professor Botkin has been accustomed to regard vascular diseases as dependent to a great extent on alterations in the nervous system, and Dr. Lewaschew has made some experiments in his laboratory for the purpose of investigating this point. These experiments were made by irritating the sciatic nerve in a dog by passing a thread soaked in a little acid into it—the results depending upon the intensity of the inflammation thus occasioned. If the thread caused only a very limited local inflammation, the temperature of the leg rose very little or even sank, but, if the inflammation affected a large piece of the nerve, the temperature of the leg rose very much, the vessels became much dilated and pulsated forcibly. This appears to be due to irritation of the vaso-dilating fibres of the nerve and not to paralysis of the vaso-constrictors, inasmuch as after a certain time, varying from three or four days to five months, the symptoms again disappeared. When the irritation of the nerve is moderate, the hyperæmia of the foot is succeeded by alterations in sensibility, the limb becoming very tender; strangely enough the increased sensibility is chiefly in the part of the limb which receives its innervation from the crural nerve, while in that supplied by the sciatic nerve the sensibility is unchanged or even lessened. After the hyperæmia had disappeared it could be again produced by putting a fresh thread into the nerve. On microscopic observation of the vessels in the irritated limb it was found that they presented abnormal appearances scattered over them here and there but not affecting their whole extent. The adventitia appeared to be first affected, and exhibited a new formation of vessels much dilated by an accumulation of blood-corpuscles in them, and a number of cells surrounding the vessels. In some places the newly formed vascular loops pass into the middle coat of the arteries between the muscular fibres, which they separate. Some of them are surrounded by leucocytes which separate the muscular fibres still more; in this way the integrity of the middle coat is destroyed. If the alterations in the vascular walls are extensive and the blood pressure is high, aneurismal dilatations must form proportionate to the extent of degeneration. If the vascular walls are little altered or the blood pressure is not high, aneurismal dilatations may be absent, but may suddenly occur whenever the blood-pressure rises quickly, as from muscular exertion or mental emotion. As the experiments of the author have shown that irritation of nerves causes displacement of the middle coat of the vessel by connective tissue and adhesion of the inner coat and adventitia so as to form a single membrane, and as these conditions are exactly what have been found in the development of aneurismal dilatations, he considers that we must look upon certain aneurisms at least as dependent upon alterations in the nerves. (*Virchow's Archiv*, vol. 92, April 1883.)

**Action of Digitalin on the Heart and Blood-vessels.**—Messrs. Donaldson and Stevens have recently investigated with great care the variation in the work of the heart, and the change of resistance offered by the blood-vessels to the flow through them (in the case of the terrapin and frog), caused by digitalin. In so doing, they have revised much of the work already done on this subject, and in the end come to the following conclusions: (1) Digitalin causes a decrease in the work done by the heart. (2) In moderate doses it increases the blood-pressure. (3) It causes a rise of mean blood-pressure by constricting the arterioles and capillaries, probably through its action on the muscular coats. (*Cambridge Journ. of Physiol.*, August 1883.)

**The Absorption of Water in the Kidney.**—For a number of years past Professor Ludwig has held that the urine as secreted by the glomeruli of the kidney is watery, and undergoes concentration by absorption of the water during its passage through the tubules. Latterly the experiments of Heidenhain have led to this theory being to a considerable extent discarded and the older one of Bowman again adopted: according to which the water is secreted by the glomeruli, and solids by the epithelium of the tubules. It is probable however that both these opinions are correct, and that, while the function of the glomeruli is to secrete water and that of some parts at least of the tubules is to secrete solids, other parts of the tubules have the function of reabsorbing water. This has recently been demonstrated experimentally by Dr. Ribbert of Bonn who has extirpated the medullary part of the kidney in a rabbit so that he has been able to collect the urine as it is secreted by the glomeruli and before it has passed through the tubules. He has found that the urine secreted by the glomerular substance alone is much more watery than that which issues from the entire kidney. It is also much more abundant, being as much as the normal amount. He shows that the medullary substance of the kidney has the power of absorption, by injecting a small quantity of potassium ferrocyanide into the pelvis of a healthy kidney and then tying the ureter. About an hour afterwards the solution of ferric chloride was injected through the renal artery. The cortical substance of the kidney thus treated was coloured only by the iron, but the medullary substance became of a deep blue; this showed that the ferrocyanide of potassium had been absorbed by the medullary substance alone. Further observations appeared to show that the absorption took place by the lymphatics and especially by those connected with Henle's loops. These experiments the author considers tend to explain the abundant secretion of urine in cases of interstitial nephritis. This is usually supposed to be due to increased blood-pressure, but the author thinks it is very probably due, in great part at least, to interference with the reabsorption of the urine in the medullary substance. They also tend to explain the alterations which the urine undergoes in the pelvis of the kidney in hydronephrosis. (*Virchow's Archiv,* vol. 93, July 1883.)

**Antipyretic Action of Resorcin.**—Sarbeck has examined this subject and finds that resorcin quickly reduces temperature, renders the pulse slower and firmer, dilates the vessels of the face and skin generally, and causes great perspiration, almost like pilocarpin. It lessens the frequency of respiration, and renders the brain clearer when it has been previously dull in consequence of the fever. The tongue is markedly influenced, it becomes moister and the brown crusts become changed into a yellowish-white fur. The action on the pulse and respiration is probably only due to the reduction of the temperature; while the action of the drug in lowering the temperature is exceedingly rapid, it is very transitory, and the temperature rises quickly again. It reduces temperature more quickly and to a greater extent than any other antipyretic. It is apt to produce cerebral symptoms resembling those of quinine or salicylate of sodium. Sometimes the restlessness of the patient becomes very great, the respiration more rapid, and dyspnœa may be present. The patient can hardly be kept in bed, and delirium generally of a lively character occurs. Frequently slight twitchings occur in the muscles of the eye, face, and extremities. Sometimes in the place of delirium deep sopor is produced; these symptoms also quickly pass away. By giving the medicine in fifteen-grain doses every half hour the temperature may be kept low, but the cerebral effects still occur. They are not removed by combination with quinine, opium, or atropia. Resorcin is excreted by the kidneys—it does not irritate them in its passage or produce albuminuria. As a general antipyretic, resorcin is not so good as quinine or salicylate of sodium on account of the nervous symptoms which it produces. It may be serviceable, however, to cut short a single attack of fever, and may then be given at the commencement of the fit. It had no curative action in a case of ague which was at once cured by quinine. [*Practitioner,* xxxi. 63.] (*Deut. Archiv f. klin. Med.,* p. 515, vol. xxxii.)

**Action of Drugs on the Associated Movements of the Eyes.**—Högyes along with Kovács and Kertésez find that the associated movements of the eyes are disturbed by chloroform, ether, morphia, codeia, and picrotoxin. Under chloroform peculiar involuntary movements of the eyes occur, and the normal compensatory movements are enfeebled. This appears to be due to the chloroform first stimulating the associating centre for the movements of the eyes, and afterwards paralysing it. The primary stimulation causes peculiar involuntary bilateral movements of the eyes, and during the progress of the paralysis the passive bilateral movements are almost abolished. Recovery occurs from this exhaustion in cases which are not fatal. The action of ether is in the main the same as that of chloroform, chloral has also on the whole a similar gradual paralysing action, but during narcosis the centres for individual movements of the eyes are not all affected at the same time. There is this difference also between ether and chloroform: that at the commencement of the chloroform action there is vertical nystagmus, and convergent—or divergent—squint. At the commencement of ether narcosis there is a lateral rotation with or without vertical nystagmus. Codeia causes horizontal nystagmus. In suffocation there is vertical bilateral nystagmus, passing into convergent bilateral nystagmus and then exophthalmos; in the last stage there is lateral rotation. The passive bilateral movements of the eye which regularly accompany movements of the head and body in the normal animal are altered by chloroform, ether, chloral hydrate, nicotin, conia, strychnia, picrotoxin, curari, morphia, narcotin, codeia, and atropin. The alterations consist either in weakness or complete arrest of the oscillations of the eyeball. The oscillations are weakened but do not entirely cease under the action of chloroform, ether, chloral hydrate, and codeia. They are first weakened and afterwards completely arrested by nicotin, conia, strychnia, picrotoxin, curari, morphia, narcotin, and atropin. Symptoms of irritation occur at first during the action of chloroform, ether, morphia, and picrotoxin. The action of all these drugs, with the exception of curari, as well as the action of suffocation, depends upon irritation and paralysis in the nerve-centres for the associated movements of the eye. (*Archiv f. exper. Path. und Pharm.*, p. 81, vol. xvi.)

# Notes and Queries.

SICKROOM CHART.—We have received from Mr. Stickland a series of sickroom charts which promise to be very useful. One is intended for the day, from 8 A.M. to 8 P.M., and another for the night. On each chart is a column for every quarter of an hour, and the chart is ruled correspondingly, so that opposite the time may be entered in other columns the nature of the nutriment, the stimulant, and the medicine given, the duration of sleep, the relief of the bowels, quantity of urine, pulse and temperature. A place is also marked for the change of nurse, and a space for remarks is left at the foot of the chart. A weekly chart is also supplied along with them: the whole fifteen charts required for seven days and seven nights, including the weekly one, are supplied for the small sum of eighteenpence.

## ERRATUM.

In Dr. Brunton's article, "On the Pathology of Dropsy," in the September number of THE PRACTITIONER, p. 199, line 3 from top,

*for* "carbolic acid," *read,* "carbonic acid."

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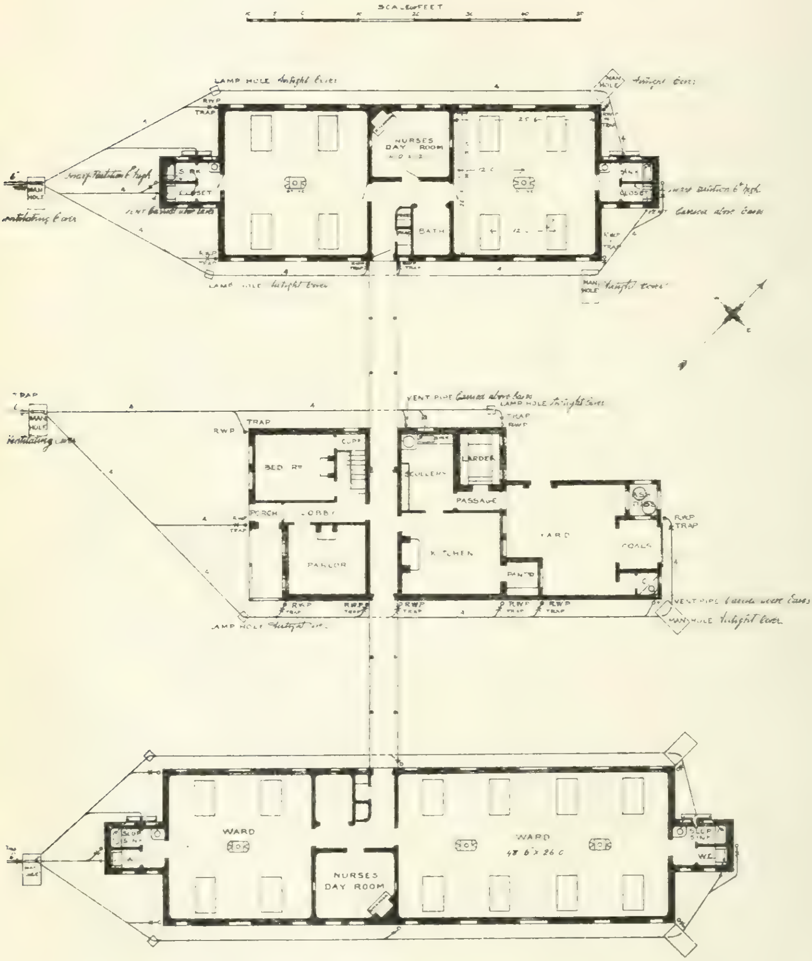
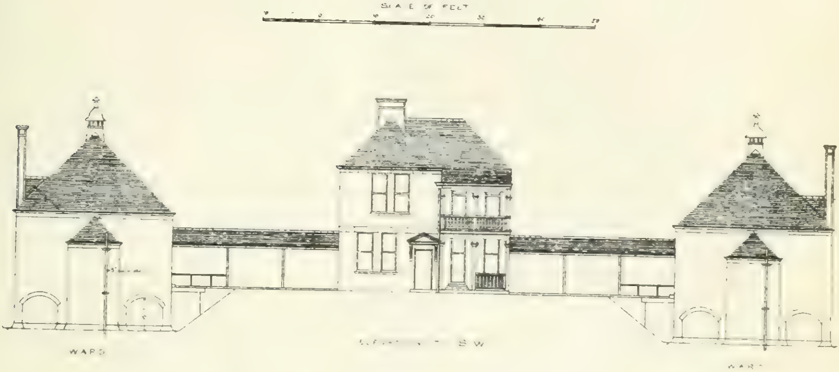
⁂ Any of the foreign works may be procured on application to Messrs. DULAU, of Soho Square, W.C.; WILLIAMS and NORGATE, of Henrietta Street, Covent Garden, W.C.; or BAILLIÈRE, of King William Street, Charing Cross.

# A SCHOOL SANATORIUM.

## PLAN I



PLAN 2



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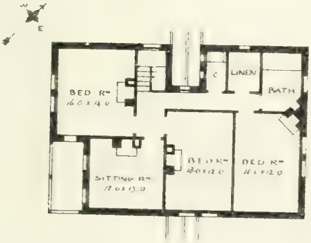
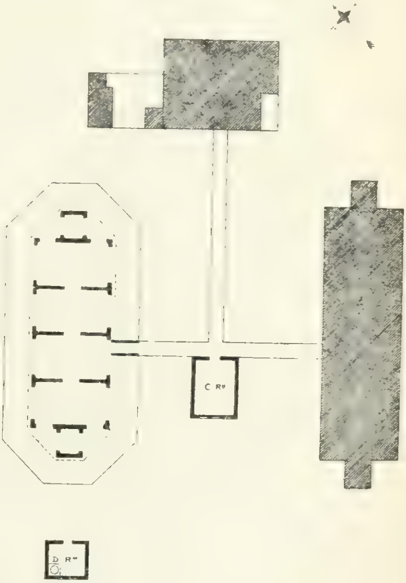
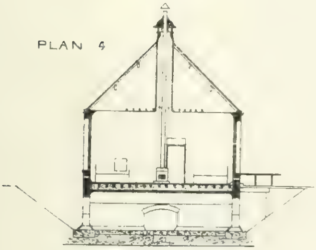


FIRST FLOOR PLAN OF ADMINISTRATIVE
[illegible]

PLAN 5



PLAN 4



TRANSVERSE SECTION OF A WARD

# Department of Public Health.

## A PLAN FOR SCHOOL SANATORIUMS.

BY CHARLES E. PAGET, M.R.C.S., L.R.C.P.,

*Hon. Sec. of the Epidemiological Society of London.*

THE first matter for consideration in the building of a school sanatorium may well be as to the kind of establishment which is necessary for a school of any considerable size, or, in other words, a consideration of the kinds of sickness that should receive treatment in the sanatorium.

It is at once clear that in whichever way this point is discussed the suitability of the sanatorium will necessarily be dependent on the purposes for which it is to be built, and that the question of suitability can only be solved by deciding what cases of illness it should receive for treatment. In all large schools, accidents, infectious illnesses, and mild forms of indisposition are very generally present, and although they are not often matters of great moment, yet experience has shown that they are liable to become inconveniences and serious troubles if not promptly treated and efficiently provided for. The ailments of school-life are, however, only likely to affect seriously the whole work of a school when they are of an infectious character, and as regards several of the specific fevers, youth is known to be a condition favourable to their spread. So also, if when they appear, the means for checking their advance be not at hand, and capable of being put at once into action, the most serious results to all concerned may be surely expected. What then has to be decided is the part that a school sanatorium should take in the treatment of school ailments; whether, in short, it should be a *general* hospital, or be reserved for those cases only which, if not at once isolated, would cause an epidemic in the school.

The solution of this question may be arrived at by a consideration of such evidence as is contained in Dr. Thorne Thorne's report on "The Use and Influence of Hospitals for Infectious Diseases,"[1] and of the system generally adopted in most of the large schools of this country. The sum of Dr. Thorne's investigation of the point in question may be more or less expressed in his own words, by saying, that the treatment of fevers and general sickness in one building, or of two of the infectious fevers under the same roof, has proved most unsatisfactory, owing to the frequency with which infection has spread. These conclusions were not arrived at hastily, and are the more to be noted because they are based, amongst other things, upon the experience of what may be considered as one of the best arranged *general* hospitals in the kingdom. Such evidence is opposed to any ideas of a school sanatorium serving as a general infirmary for the school, and it is supported in no small measure by the best experience and observation of responsible persons connected with large schools. The system most generally adopted in such institutions is founded on such good principles that it is difficult to understand its occasional failure, except by suspecting that it has been imperfectly carried out. The general plan adopted is to have a sanatorium ready for the reception of infectious cases exclusively, and to arrange for the treatment of accidents and ordinary indispositions within the school boarding-houses, in certain rooms set apart for the purpose, and known in popular school parlance as "sick-rooms." By such an arrangement the simplest and most useful separation of one form of illness from the others is at once made, and all that is then necessary is to insure in as full a manner as possible that the separation is a complete one. In reviewing therefore such evidence as is contained in Dr. Thorne's report and in the plan most usually carried out successfully in large schools, it may be taken for granted that a school sanatorium should bear an exactly similar relation to a school as an infectious hospital does to a township. For by such an arrangement the best means are afforded for checking at once the spread of any infectious illness in the school, and for preventing serious interference with school work.

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[1] See *Supplement* by the Medical Officer to the *Tenth Annual Report of the Local Government Board*, 1882 [C. 3290].

But the conclusion having been arrived at that the sanatorium should be for the reception of infectious sickness only, it becomes necessary to consider whether the ordinary form of sanatorium is capable of meeting at all times the requirements which come upon it. The usual school infirmary is a single detached building suitable for the treatment of one infectious illness at a time, but quite unfit for the simultaneous treatment of more than one. Since it is as necessary to keep one patient suffering with scarlet fever completely separate from another having measles, as it is to keep any patient with an infectious fever from one not so suffering, it is obviously impossible to secure such a separation if two patients, each having a different fever, are placed in the same ward, or, indeed, if under any circumstances the transmission of either fever from the one patient to the other is rendered possible by the constant intercommunication of attendants. If, therefore, more than one fever is to be treated in the school sanatorium at the same time, it is necessary that there be made a completely separate provision for each. But it may be asserted that there is no necessity for a school to provide for the treatment of more than one infectious disease at a time. It is, however, within the experience of the governors of more than one school that a neglect of such provision has caused an inordinate amount of anxiety and expense. In illustration of such experience may be related an occurrence of not long ago, which took place at a large school having an admirable sanatorium for the treatment of *one* disease at a time. There was in this school an outbreak of mumps—a not uncommon affair—and the cases as they were diagnosed were sent to the sanatorium. So far all was well, and in a short time it was certain that the disease had been successfully checked; but, before the convalescence of even one half of the cases was well established, scarlet-fever broke out in the school. The cases of scarlet fever required to be kept separate from the healthy boys, and mumps were certain to break out again in the school if the only partially cured ones were to return. To meet this difficulty, the boys with mumps were lodged at some considerable expense in the town where the school was, and those with scarlet fever were put into the Sanatorium. It would be superfluous to comment further upon this case; it sufficiently well illustrates an inconvenience which has been more than once experienced in large schools, and is liable to happen again when their resources are insufficient for the demand made upon them. But the annoyance or discredit of such an affair might be very easily avoided, as suggested, by making a suitable provision for the treatment of, at any rate, two different communicable diseases at the same time. And such provision may be effected in the same sanatorium under certain conditions which at present prevail in the most approved infectious hospitals. It is so rare however, for more than two infectious illnesses to appear in a school in England at the same time, although they frequently occur at different times during the same term, that it may be considered as unnecessary to make provision for more than two. But that this provision at least is required can scarcely be doubted, for not only does it insure against a repetition of such misfortunes as have just been alluded to, but it admits of a *doubtful* case of illness being removed to the sanatorium till its nature is apparent, even although one specific fever is under care there at the time. Such considerations are therefore in themselves important, apart from the moralities which they involve, as affording a protection against unprofitable outlays and completely useless regrets.

The essential conditions of an infectious hospital must of course obtain in the school sanatorium which is built for the same purposes, and special care must be exercised in insuring a complete separation of the sanatorium from the school-buildings and playgrounds. Such a separation necessitates that the building be at a considerable distance from the school, and be placed under the strictest regime when in use, not only as regards the association of persons within it, but also as regards their permissible communication with persons outside. For on such may depend the safety of a community in no way connected with the school, but which has a distinct right to demand such protection, and will most certainly seek to enforce it. But, besides, a good wall or fence of at least six feet in height will help largely in preventing such illicit communications as might lead to a spread of disease.

The site of the sanatorium should of course be selected with due care to an easy communication with the school, so that a long, and therefore objectionable journey for the sick may be avoided, and any necessary intercourse between the two buildings be held without great hindrance. In the choice of the site, however, it is important to remember that special precautions should be taken against any possibility of overcrowding either the buildings or the patients confined in them, for it is essential that there should be a free circulation of air about every part of the building. It is assumed on a general calculation, that for the purposes of a school of from 400 to 500 boys, a suitable sanatorium which is prepared to receive twenty, will be found sufficient to check the spread of infection in that school. For a sanatorium of such capacity, an acre of ground should if possible be secured; less than that amount is liable to create difficulties with the inhabitants of the neighbourhood, and inconveniences in securing the required separations in the building itself. The limits of ground at disposal must of course enter largely into the question of a suitable building; but, wherever it is possible, the wards of the infirmary should be single-storied. At the same time, it is infinitely preferable if the site chosen be insufficient for the more extended plan, to build them of two stories, so that a good surrounding of ground about the whole building may be obtained. There is, however, a distinct advantage in having a larger site than at the time may seem to be necessary, for, if at any future time the sanatorium prove unequal to the wants of the school, it will be easy then to make the necessary additions, and at all times the surplus ground will be very valuable as a resort for convalescents. When the site has been determined on, the sanatorium should be so built that its front and back aspects may face respectively S.E. and N.W., so that continuous warmth and light may be secured for the building, and direct exposure to the east wind avoided.

The accompanying drawings are meant to illustrate the plan upon which provision may be secured for the treatment of two infectious fevers at the same time. The principle of the plan exists in there being a detached administrative-block, and two distinct and separate pavilions, each of which is for the reception of one disease at a time. In discussing this plan, it will perhaps be convenient to deal with each building in order, and to commence with the administrative block.

It is suggested that this be built in two stories, not only because such an arrangement is unlikely to prove harmful, but also because by this means the extent of ground required for the whole sanatorium may be less than it could be if the administrative block were of one story only. It should be built to insure three chief provisions, namely, 1st, a suitable living accommodation for the permanent staff of the sanatorium; 2nd, sleeping rooms for the nursing-staff; 3rd, an efficient kitchen to serve the chief wants of the whole establishment. The first of these will be sufficiently obtained if there be a sleeping and living room for a care-taker and his wife, or for a matron, who can have the services of a male porter placed at her disposal. The second requires that there be a separate sleeping-room for each nurse engaged in the sanatorium, whether she be on day or on night duty. This is specially necessary to insure that no night-nurse shall be disturbed when taking her rest during the day-time. It will be seen on reference to plan No. 3, that rooms are arranged for two day and two night nurses—the outside limit, doubtless of what will be required at any one time, but none the less necessary when the sanatorium is full of patients. The third includes a kitchen, having a cooking stove and boiler sufficient for the requirements of the whole of the staff and the patients, a capacious larder, a pantry and scullery. It is necessary that the chief part of the cooking should be done in this building, so that there may be as little discomfort to the patients as possible from the smell of cooking, and that economy may be practised within the establishment.

Of course, all those things which are essential in the erection of an ordinary dwelling-house are of equal importance in the building of the administrative block; the differences must be in internal arrangements only.

The position of the administrative block to the pavilions, and the approach to it, must be so planned that the necessity for visitors to pass in front of any of the ward-windows may be avoided. Apart from any exaggerated idea of danger, there is a decided risk run by all, who being constitutionally unprotected, are brought into close proximity with zymotic diseases, and also if placed for any length of time in a strong cross-current of air which ventilates a room containing infectious fever cases. The distance between the pavilions and the central building should be not less than thirty feet, and the only means of communication between these several buildings—other than that of the telephone—should be by a raised but open footway, protected from rain by a simple roofing supported on pillars. If these open passages are shut off from each building by a door, the isolation of one building from another will be as nearly complete as is possible.

The linen of the whole establishment should be stored in the administrative-block—that which has been used in the wards being first thoroughly disinfected—for this building is kept at a uniform temperature, and it is of great importance that there be no discredit arising from mismanagement or delay in cases of emergency, as would certainly occur from damp and improperly aired sheets and the like. There should be some arrangement made in the yard of the central-building for the reception of refuse. An ashpit of the ordinary kind, capable of holding a cart-load of stuff, is quite inadmissible, for it is of the highest importance that the air around patients should be kept as pure as possible. A couple of tubs, each of which an able-bodied man could carry when full, should be the only receptacles provided for the purpose, and their contents should be at once removed if the emanations from them become at all offensive. The coals for the whole establishment should also be stored in the yard, and a daily supply issued to each pavilion when it is in use.

The ward-pavilions should be built upon arches so that there may be a free circulation of air below them as well as on all sides.

The arches must be built upon a firm foundation of concrete and should be of such a height as will permit of a man keeping the space beneath the pavilions clean and free from rubbish. The ground around the pavilions should be excavated and shelved down to the upper surface of the concrete, and the footways from the administrative-block to the pavilions simply thrown across the open space thus made. The pavilions themselves may be built of brick or stone, whichever may happen to be the more convenient material; but the thickness of the walls should be not less than fourteen inches, as, if they are thinner, it will be found immensely difficult to maintain an equable and sufficient temperature within all parts of the wards. The inner surface of the walls may be either cemented, or tiled, or faced with glazed bricks; under any circumstances there must be neither papering nor wainscoting. The roofs may be flat and of concrete, or be sloping with a flat ceiling inside, the object in either case being to insure that there will be no projecting beams or ledges upon which infective material can find a resting-place. The former plan is the better of the two, but should the latter be decided on, the important feature of it—the flat ceiling—must not be disregarded. The pavilions being built upon arches and vaulting, there is no necessity for a damp-course as there would be if they were built on a level with the ground surface. The joists of the floor may therefore be laid in the concrete overlying the vaulting, and the flooring laid on them as shown in plan No. 4.

The floors of the wards should be of wood and laid very carefully, the boards being grooved and tongued so that there may be no inter-spaces between them; so also, if they are stained and kept polished, there will be small difficulty in insuring their cleanliness. But, besides this mere question of convenience, there is a much more important medico-sanitary reason why this plan should be adopted. The continual swabbing and washing of unpolished ward-floors, when a high temperature is maintained in the ward itself, must result in loading the atmosphere with moisture; and, considering the susceptibility of fever-patients to contract chills and colds, and the serious results which frequently follow on them, it is manifestly unwise to add the risks from them to those which are already present in the action of a fever. A polished floor can, however, be quickly washed over and effectually dried, and the unnecessary exposure of patients to the influences of damp be avoided. Bees-wax and turpentine are cheap substances, can be obtained anywhere, are readily applied, and probably therefore will be found the most convenient for use.

An all important feature in the proper construction of an infectious hospital will be observed on reference to the plans No. 1 and No. 4, namely, the careful avoidance of any right angles in the interior of a ward. Any one who will take the trouble to do so will find that it is possible to dig out with a penknife from the corner of a room where two side-walls and the floor meet—even of a so-called "clean room"—an amount of dirt which is often surprising. In the ward of a hospital this may contain epithelium, fine shreds of lint, and many other of the best materials for the spread of infection. In the building of a modern sanatorium for infectious cases, it is plain that such a storage of contagium should be sedulously avoided. The best way, as it seems, to avoid this mischievous defect of right angles in a ward is to join converging walls in a quadrant, the concave of which looks into the ward, and to curve in a similar manner, either length of each wall with the ceiling and floor respectively. By such means all structural right angles within the wards which might harbour infective material will be prevented. The curves of the walls with the floors may be obtained by means of bricks shaped as desired, and which will take the place of ordinary skirting-boards.

The number of the beds in each ward must necessarily depend upon the square and cubic space of the ward. Each patient requires 144 square feet of floor-space, and 2,000 cubic feet of air-space. At the same time, each bed should stand one foot away from the wall at its head, so that there may be a complete circulation of air around it, and this foot of space must not be included in the calculations made for that bed. If therefore the beds are ranged on either side of the wards these latter must be made twenty-six feet wide, and, in accordance with their other requirements, fourteen feet in height. Each bed should be separated from its fellow by a window, and should have that independent ventilation between it and the floor which is so necessary. This may be procured by means of an air-brick placed immediately above the curving of the floor, and which can be closed by means of a sliding door during inclemency of the weather.

The windows of the wards should be on opposite sides directly facing each other, and should be double-hung sliding sashes for the purposes of ventilation. They ought not to be more than three feet from the floor, and should reach to within six inches of the ceiling. The amount of window-space will be amply provided for if one square foot be allowed for every seventy cubic feet of ward-space. More than this is apt to lower the temperature of the ward unduly, and so interfere with the well-being of the patients.

Stoves open on two sides, and placed in the central line of the ward, will probably be found the best means of maintaining an equable temperature, and they may be conveniently adapted for ventilation purposes when in use. For if the chimney of each stove be surrounded by an open funnel, as it passes through the roof, the heat of the chimney will raise the temperature of the air in the funnel, and insure its exit into the outer cooler atmosphere.

It will probably be found most convenient in school sanatoriums for the pavilions to differ in size. It frequently happens in schools, when two outbreaks of illness occur, that one is of greater extent than the other, and it would obviously be ill-planned if the accommodation for one were superfluous and for the other inadequate, as might be the case if the pavilions were of equal size. The pavilions should therefore not be of the same size, but should be so arranged that twelve cases of one illness could be treated in one of them, and eight in the other. Each pavilion should contain two wards, so that if some cases be more serious than the rest, they may have the special seclusion which they would require, and that if not in use the second ward may be used as a convalescent-room for the pavilion.

Between the two wards in each pavilion a nurse's room may be most conveniently placed. This should only be a nurse's day room, her sleeping apartment being in the administrative-block. Whenever it is necessary for a nurse to be on duty in the pavilions at night, a proper night-nurse should be employed, since it is undesirable for a nurse either to sleep in the room she inhabits by day, or to be over-worked by having night as well as day duty to perform. In either side wall of the nurse's room may be fitted a fixed sheet of glass through which the nurse may command a view of both wards, and have all the patients in the pavilion under her immediate supervision. The room should be fitted also with a small kitchener, so that the small and immediate wants of the patients may be supplied readily.

It will be convenient, however, to have opposite to the nurse's room a small cool closet in which may be kept the daily allowances of beef-tea, milk, and the like, rather than that these should remain in any warm room. The bath-room of each pavilion should be furnished with a moveable-bath, which can be wheeled when necessary to the bed-side of a patient; but which may be made to answer the purposes of a fixed bath for convalescents by placing it over a sink let into the floor, so that the waste may be readily run off, while a hot and cold water supply may come through taps projecting over the rim of the bath. In this way, the same bath will answer the purposes of all the patients in the pavilion.

Great care must be exercised in the arrangement of the ward-offices—the closets, ward-sinks, and lavatories—for they should be cut off from direct communication with the wards, and the two former as nearly completely as possible. All these offices may be conveniently placed together in a building which abuts on the pavilions, and is constructed internally on some such plan as that figured in plan No. 1. In this plan the sink and closet are separated from the ward by a door, and an intervening lobby. The opposite side walls of the lobby, besides having windows, should afford means for securing a permanent cross-ventilation for the lobby; if this be done, there can be no objection to placing the lavatory-basin in it. The sink and closet must, however, be shut off from the lobby by having their front wall built up to the ceiling and their doors constantly latched. These offices being placed side by side, and the wall between them being only a "dummy" of six feet in height, their independent ventilation may be secured by making permanent openings in their outer walls at a height above that of the top of the central "dummy."

Although the furniture of the wards should be plain and simple, without carving or fluting, yet it should not be of such a kind as to make the wards look gloomy. Iron bedsteads seem to be most in favour in infectious hospitals, for they are more easily cleansed and disinfected than any other kind. It will be useful for them to be furnished with a wire-coil spring mattress, so as to reduce the amount of bedding as far as possible. With such a bedstead nothing more will be required for the patient to lie upon than a thin hair mattress, which can be thoroughly disinfected after use in an efficient stove.

No sanatorium should be without a disinfecting-house, for all disinfection which may be required ought to be done on the premises of the sanatorium, and nowhere else. The building, the size of which will necessarily depend upon the requirements of the sanatorium, must be built away from the hospital buildings, and will require to be fitted with a thoroughly good disinfecting stove, together with the other appliances which may be required for general disinfection processes.

It has been suggested in this paper that, when necessary, the reserve-ward in each pavilion may be made use of as a convalescent-room for that pavilion, and for the purposes of most school sanatoriums it is at least doubtful if further provision will be necessary. But for large schools a convalescent-room may be found of great service apart from the purposes to which it would be ordinarily put. For if, at any time, a case of doubtful illness arose, and the sanatorium being in full use and therefore unable to receive it into the ordinary wards, it might be at once isolated in the convalescent-room until its nature was exactly determined. The only alternative of course would be to isolate the case as far as possible in one of the sick-rooms of a boarding-house, but that should never be done if it can be avoided. The whole question, however, of providing a convalescent-room at the sanatorium is one which may best be decided by those whose duty it is to determine whether the sanatorium is or is not sufficient for the school.

The drainage, or other system of disposal of waste matters and excrement, is a matter of great importance in the building of a sanatorium, relating as it often does to the suitability of situation, and involving often other considerations. In the accompanying plans, it has been supposed that facilities exist for connecting the drainage of the hospital with a regular system of sewers in its neighbourhood. On such a premise the description of the drainage is materially simplified. The drainage of each block of buildings should be separate and distinct, and should discharge into the sewer through a pipe which has no connection with any other system of drainage.

The drains of each block, moreover, must be disconnected from the main sewer by means of a disconnecting trap in the pipe leading to the sewer. This trap should be immediately beyond the man-hole near the sanatorium boundary, so that it may be readily attended to if out of order. For the purpose of commanding a view of the drains running down from either side of each block, they should converge to the boundary man-hole. On reference to plan No. 1, it will be seen that a complete inspection of every part of the drains may be obtained by means of alternating man-holes and lamp-holes. In order that the ventilation of the drains of each block may be secured, the boundary man-hole should be covered with a perforated grating, and so provide an air-inlet for the drains, the foul air out-lets being ventilating shafts run up above the roof from each soil-pipe. With the exception of the boundary man-hole, all the other man-holes and the lamp-holes must be covered by air-tight lids to prevent their becoming drain ventilators, and so discharging foul air under the windows of the wards.

The sinks and lavatories may for convenience discharge outside the projecting buildings into a common trough or gutter. The open mouth of each waste-pipe should, however, be eighteen inches to the side of the gully-hole, for it is certain that gullies tend to become foul, even above the water-trap in them, and it is unwise therefore, to place *over* them the mouths of pipes which lead directly into a dwelling. Each gully should of course be trapped, and have an iron bucket with a long handle which can be lifted out periodically, and with it all grease and sediment which have collected there. Ample means should be provided, in addition, for the thorough flushing of both sinks and closets.

The accompanying plans do not provide for the storage of rain-water. It may, however, be thought advisable sometimes that this should be done, and then great care should be taken that the collectors and filters are of a very effective kind, and that there are good iron cisterns for its storage. When, however, there is a good water supply laid on to the sanatorium, it may be considered unnecessary to use the rain-water, which may then be allowed to run off by the drains, provided only that care be taken to insure that its discharge into them is guarded in the same manner as obtains in the case of the slop-sinks and lavatories. There can be no question about each rain-water pipe discharging into the drains through a trap.

It would be impossible for this paper to be brought to its conclusion without a very grateful reference being made to the many kind suggestions of Dr. Thorne Thorne, and Mr. P. Gordon Smith, F.R.I.B.A., also to the draughtsmanship of Mr. C. G. Killmister. Without such aids as they gave, it is more than probable that important details of construction would have escaped notice, and that fallacies would have appeared.

# THE PRACTITIONER.

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## Original Communications.

### ON SOME FORMS OF INCREASED HARDNESS OF THE EYEBALL, AND THEIR TREATMENT BY LOCAL APPLICATIONS OF ATROPINE, OR OF ESERINE, AND OTHER MYDRIATICS OR MYOTICS.[1]

BY JOHN TWEEDY, F.R.C.S.,

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In the Introductory Address which I had the honour to give at the opening of this session, I said, in speaking of preventive medicine, that the medical profession would retain the most important part of its duties and all, or more than all, its present share of honours, if every drug in the pharmacopœia were to become extinct. More importance has been attached to this statement than it deserved, and certainly more than I intended it to receive. Professional, if not retributive, justice seems to require that I should qualify the statement at the earliest opportunity by taking as one of the first topics for clinical remark this session a subject that pre-eminently illustrates the value and efficacy of drugs judiciously and rationally employed. No intelligent man can doubt the reality of a science of pharmacology, no one moderately observant can question the beneficent action of drugs suitably prescribed. At all events, I did not wish to disparage the scientific or the empirical use of approved drugs, but rather to protest against their indiscriminate and ignorant abuse. The subject which I have selected for comment to-day, viz., increased hardness of the eyeball, is one that illustrates the local action of drugs perhaps better than any other.

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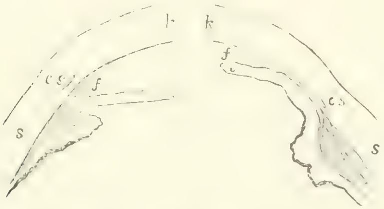
[1] *The substance of a clinical lecture delivered at the University College Hospital on October* 18*th*, 1883.

Increased hardness of the eyeball is one of the most conspicuous symptoms of glaucoma, and is, indeed, so closely identified with it that many persons now regard "glaucoma" and "increased tension" as synonymous. In this there lurks a fallacy—a fallacy which in some instances is not wholly devoid of danger. Though increased tension is one of the most prominent features of glaucoma, there are other diseases, in which increased hardness occurs, which are not glaucomatous, and which call for entirely different modes of treatment. Glaucoma, as we understand it, has only been definitively differentiated since 1856, when Von Graefe introduced and recommended the operation of iridectomy for its relief.

It is necessary at the beginning to dismiss from your minds all associations between the etymological and the pathological meanings of the term glaucoma. Etymologically glaucoma means a greyishness, or bluish-greenness, of the crystalline lens, whereas pathologically it denotes a group of symptoms in which this colour phenomenon may or may not be present. Glaucoma, in the pathological sense, has been variously defined and explained. By some it has been stated to be a serous form of irido-choroiditis; by others, a neurosis of the secretory nerves of the eyeball; by others, a hardening of the sclerotica. But the researches of pathologists and of microscopists have shown that glaucoma is not a specific and idiopathic disease, but rather a group of symptoms dependent upon certain abnormal physical states of the eyeball. The peculiarity of glaucoma is increased hardness of the eyeball, due to an accumulation of the fluid contents within the globe, resulting from diminished elimination. The physical state which causes this is a narrowing or obliteration of the corneo-iridian angle of the anterior or aqueous chamber. In glaucoma this angle is obliterated, either in consequence of the iris lying in apposition to the cornea, or from its being actually adherent to the cornea.

Naturally, at the periphery of the anterior chamber, there is an angle between the posterior layer of the cornea and the anterior layer of the iris (Diagram, *f*, left side). In this angle is a delicate meshwork of fibres, formed by the continuation of the membrane of Descemet, or posterior elastic layer of the cornea, on to the iris. The membrane of Descemet breaks up at the periphery into delicate fibres, which anatomists designate the *ligamentum pectinatum iridis.* These fibres are now known to be lined by endothelial cells, and to open into lymphatic spaces, called the spaces of Fontana (Diagram, *f*). These spaces, in their turn, communicate with the canal of Schlemm, which forms a vascular plexus around the cornea. Fluids are secreted by the ciliary body, and perhaps the posterior layer of the iris for the nutrition of the lens and for the formation of the aqueous humour. In the natural state this fluid finds its way from the posterior chamber of the aqueous into the anterior chamber, and, having served its purpose, escapes through the spaces of Fontana, thence into the canal of Schlemm from which it is finally carried away by the anterior ciliary veins. As long as the spaces of Fontana and the adjacent vascular canals are unobstructed the fluids secreted by the ciliary body find their way out of the eyeball, and the equilibrium between secretion



The diagram represents a section through the corneo-scleral region, ciliary body, and iris of a healthy (left side), and of a glaucomatous eye (right side): *k*, cornea, *s*, sclerotica, *i*, iris, *f*, spaces of Fontana, *c s*, canal of Schlemm. In the glaucomatous eye the ciliary body is atrophied, and the iris lies against the cornea preventing the escape of fluids through the spaces of Fontana and canal of Schlemm.

and elimination, of the anterior segment of the eyeball at all events, is maintained.

In a large number of eyes, however, this equilibrium is disturbed; secretion goes on while elimination is diminished or arrested, and hence the accumulation occurs which sooner or later gives rise to increase of the intraocular contents, manifesting itself by increased hardness. Now, in true glaucoma this elimination is checked in consequence of the periphery of the iris being pressed forward, and, it may be, actually united with the cornea, so that the fluids which are still secreted by the ciliary body cannot make their escape through the drainage-apparatus at the angle of the anterior chamber (Diagram, *f*, right half). This accumulation after a time sets up irritative changes, as all accumulations do, which may proceed, either abruptly or gradually, to inflammation, or so-called acute glaucoma. The anatomical condition of true glaucoma is, therefore, a shallowing of the anterior chamber, preventing the escape of fluids through the meshwork at the corneo-iridian angle. The aim of the practitioner is to relieve this obstruction either by surgical or other procedures. What these are we shall consider by and by.

While in glaucoma the hardness of the globe is associated with a *shallowing* of the anterior chamber, there is another condition of increased hardness of the eyeball associated with a *deepening* of the anterior chamber. Wardrop described a disease which he designated Inflammation of the Capsule of the Aqueous Humour. In this disease the anterior chamber is very deep, and in the early stages of the disease there is considerable increase of tension of the globe.[1] Some surgeons fail to make any difference, so far as treatment is concerned, between increased hardness of the eyeball with a shallow chamber and increased hardness with a deep chamber. In both the increased hardness is doubtless due to diminished elimination, though in both, and especially in Aquo-Capsulitis, there is, in addition, increased secretion. In Aquo-Capsulitis, however, the diminished elimination is presumably due to the closure of the openings from the anterior chamber into the spaces of Fontana by a coating of inflammatory lymph, such as is found in serous pleuritis. The lining membrane of the anterior chamber being inflamed and covered with adhesive lymph, does not allow of sufficient drainage, and this gives rise to accumulation within the anterior chamber accompanied with hardness. This disease is, however, totally different in its origin and course from glaucoma, and calls, in many respects, for a different plan of treatment.

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[1] In the later stages of the disease the eyeball usually becomes softer than natural, due probably to inflammatory softening.

There is yet another cause of increased hardness of the eyeball, apart from the hardness that is sometimes associated with tumours of the interior of the eyeball, and that is Iritis. In iritis the increase of tension may be as great as in true glaucoma, though the two demand different and indeed opposite kinds of treatment.

Let me explain that for the kind of increased tension which occurs in acute glaucoma that there is only one permanent remedy, and in severe cases no alternative, viz. iridectomy. The history of the introduction of iridectomy for glaucoma, and of its universal recognition as a therapeutical measure, supplies a typical illustration of the history and methods of practical and scientific medicine. When Von Graefe first performed the operation he did it tentatively, and without a clear notion of its mode and action. For many years the operation was practised in a manner purely empirical, though successfully. No one knew how or why iridectomy cured glaucoma. It is only within the last four or five years that the *scientific* employment of iridectomy for glaucoma has been possible. Of the *practice* of iridectomy Von Graefe uttered the first and the last word. He laid down at least two conditions of efficient iridectomy for glaucoma, namely, first, that the portion of iris removed should be as broad as possible, and secondly, that it should be taken as far back as possible. With these conditions all ophthalmic surgeons have always complied. We now know the reason of this. The diagram explains it at a glance. In the natural condition you observe this wide space intervening between the iris and the posterior layer of the cornea, and at the angle these lymphatic spaces which, as I have already said, are concerned in the drainage of the interior chamber (Diagram, *f*, left side). On the right side of the diagram, on the other hand, which represents a glaucomatous eye, this angle is obliterated, and the periphery of the iris for some distance is lying close to or is adherent to the periphery of the cornea. The object of iridectomy is to remove as far as practicable this adherent portion. In order to do this it is necessary that the incision should be made far back, at the very outermost portion of the anterior chamber. Otherwise only the free portion of the iris will be removed, and the drainage angle will be unaffected.

It is, however, not my intention to-day to speak of the treatment of glaucoma and the other forms of increased hardness of the eyeball by *surgical* measures. I wish rather to call attention to some of the prophylactic and pharmaceutical remedies in each of the three principal forms of increased hardness.

Two classes of drugs have been found to exercise special and peculiar effects upon the size of the pupil. One class, of which atropine may be regarded as the type, dilates the pupil, and another class, of which calabar bean, or its active principle eserine, may be taken as the type, contracts the pupil. These two classes of drugs are the sheet anchors of ophthalmic therapeutics, and a knowledge of their action furnishes the key to a large part of ophthalmic pathology. Pupil dilators, or mydriatics, are essential to the cure of iritis and for the prevention of its recurrence, and pupil contractors, or myotics, are almost equally certain and effectual in the cure of the slight forms of true glaucoma, and for the relief of severer forms.

In inflammation, the iris becomes gorged with blood and filled with inflammatory products, so that the pupil is diminished in size, and, may be, becomes blocked and occluded with lymph. The aim of the surgeon is to prevent this occlusion. The surest way of doing this is to apply locally some powerful mydriatic, so as not only to empty the iris as far as possible of stagnant blood, but also by dilating the pupil, to prevent the effusion of lymph on to the pupillary area of the anterior capsule of the crystalline lens. Atropine is the most convenient mydriatic. Mydriatics are of further use in iritis, in so far as they afford physiological rest to the inflamed tissue of the eyes, and rest, as you well know, is an indispensable factor in the repair of all damaged tissues. When a bone is broken, or a joint dislocated, the surgeon, after reducing the breach of continuity, endeavours, as far as practicable, to ensure physiological rest by means of splints and bandages. The ophthalmic surgeon aims at the same end in iritis, by applying, say, atropine to the inflamed iris. Splints and bandages are here, of course, out of the question; but atropine, whatever may be its precise *modus operandi*, gives to the inflamed tissue that amount of rest which is essential to its recovery. In iritis, therefore, of any form, and probably in any stage, the local application of atropine or some other mydriatic is of prime importance.

But in using atropine you should take care not to mistake other forms of inflammation for iritis. It has been known for many years that the application of a solution of atropine to the eye may be quickly followed by a sudden and violent outbreak of acute glaucoma. Every ophthalmic surgeon of much experience must have seen eyes that have been blinded from the application of a single drop of atropine. I am, however, convinced that these eyes were already on the verge of glaucoma, and only needed the slight bias which the action of the atropine could impart in order to complete the disaster. From the casual observation that atropine sometimes precipitated glaucoma, it was empirically suggested that calabar bean being antagonistic to atropine might be servicable in relieving or checking glaucoma. Accordingly, calabar bean was used in this tentative manner for the relief of glaucoma, and often with decided benefit, long before any rational explanation of its mode of action was forthcoming. We can now supply this explanation. As I have already explained, whenever an eye is lapsing into the glaucomatous state, that is, when the anterior chamber has become shallowed from the advancement of the periphery of the iris, so that it lies in apposition with the cornea, the application of a mydriatic, causing the radial fibres of the iris to contract, tucks as it were the mass of the iris into the angle of the anterior chamber, and leads to a complete arrest of the drainage through the spaces of Fontana. In such an eye glaucoma is always more or less imminent, and in such atropine should always be avoided. Contrarily, a pupil contractor may be of service in such a case, not only by relieving glaucoma when actually present, but also by retarding its progress, or even preventing it altogether. Though the iris may lie close behind the cornea, there may be sufficient interval to allow of the escape of enough of the secretory fluids to preserve the balance between secretion and elimination. If from any cause, whether from uncorrected hypermetropia, injury, sudden fright, neuralgia, or neurosis in which the secretion from the ciliary body becomes suddenly increased in quantity, the pressure of fluids from behind push forward the periphery of the iris it acts like a closed valve, and prevents further escape of the fluids from the anterior chamber. In such an eye the application of a myotic or pupil contractor may suffice to draw the iris away from the cornea, and to allow of the resumption of the functions of the drainage apparatus. The periphery of the iris is a fixed point, and by contracting the pupil, which is a movable point, the arch of the iris is, as it were, flattened, and thus the space between it and the posterior layer of the cornea is increased, so that fluids can once more find their way through the angle of the anterior chamber into the anterior ciliary veins.

We are now in a position to understand and reconcile the apparently conflicting and contradictory statements respecting the effect of atropine on intraocular pressure. Some authorities allege that atropine diminishes intraocular pressure, while others deny this and appeal to the inability of atropine to reduce the hardness of the globe in glaucoma in disproof of the opinion. The truth is, the effect varies with the state of the drainage apparatus at the angle of the anterior chamber. If this be perfectly healthy then atropine lessens intraocular pressure. Atropine also reduces the hardness that sometimes occurs in acute iritis with posterior adhesions. But when the angle of the anterior chamber is narrowed so far from reducing intraocular pressure atropine usually increases it, and if the angle be very narrow so that the front of the iris touches the posterior layer of the cornea, it may rapidly raise the tension till it culminates in an attack of acute glaucoma.

The various effects of atropine may be thus briefly formulated.

### I. *Atropine Lessens Intraocular Pressure:—*

(*a*) In a healthy eye with a natural anterior chamber, by contracting the radial fibres of the iris, diminishing the calibre and contents of the arterioles of the choroidal, ciliary, and iridian vessels, and lessening the amount of fluid secreted by the ciliary body.

(*b*) In acute iritis with effusion and adhesions between the iris and the anterior capsule of the crystalline lens, by contracting the distended blood vessels and emptying them of the accumulated and stagnant blood, by dilating the pupil and diminishing the bulk of the ciliary body and the iris, by lessening secretion, favouring the absorption of the fluid inflammatory products, checking cell-proliferation and the transmigration of leucocytes, by breaking down adhesions and opening up the communication between the posterior and anterior chambers of the aqueous humour, and thereby liberating the fluids pent up behind the iris, and permitting them to make their escape by the spaces of Fontana and the canal of Schlemm.

### II. *Atropine Increases Intraocular Pressure:—*

(*a*) When the anterior chamber is shallow, and the periphery of the anterior layer of the iris lies near or touches the posterior layer of the cornea, so as to obstruct the orifices of the spaces of Fontana. Under these circumstances the contraction of the radial fibres of the iris tends to pack the iridian tissue into the narrowed angle of the anterior chamber, and thus to stop the escape of fluids from the anterior segment of the globe.

(*b*) In some cases where the anterior chamber is deepened by effusion, as in Aquo-Capsulitis. Its action here is, however, slight, uncertain, and variable.

The effects of eserine on the intraocular pressure, like those of atropine, vary with the state of the angle of the anterior chamber.

### I. *Escrine Lessens Intraocular Pressure:—*

(*a*) When the anterior chamber is shallow, provided the iris be not actually or firmly adherent to the periphery of the cornea. So long as the iris is free to move contraction of the pupil pulling upon the breadth of the iris flattens the arch of the iris and tends to draw it away from the cornea, thereby widening the corneo-iridian angle and allowing of the escape of fluids through the spaces of Fontana.

(*b*) In some cases of Aquo-Capsulitis, by pulling upon the delicate fibres at the angle of the anterior chamber and tearing some of the adhesions which cover and close up the orifices. As in the case of atropine, however, the action of eserine in Aquo-Capsulitis is slight, uncertain, and variable.

(*c*) In some cases of inflammation or ulceration of the cornea, especially when the ulceration is at the margin of the cornea.

### II. *Eserine Increases Intraocular Pressure*:—

(*a*) Slightly and temporarily in the healthy eye, by determining blood to the ciliary body and iris, and thereby increasing their bulk.

(*b*) In iritis, by increasing the quantity of the blood within the eyeball, enlarging the bulk of the iris and ciliary body, stimulating the inflammatory processes, and favouring the effusion of lymph and other inflammatory products.

(*c*) In Aquo-Capsulitis sometimes, for similar reasons.

There is no specific difference between atropine or eserine and the other mydriatics or myotics. Some are stronger than others; duboisine, for example, is stronger than atropine, which in its turn is stronger than homatropine; and eserine is stronger than pilocarpine.

The recognition and appreciation of these different effects of mydriatics and myotics in different states of the eyeball is of such clinical importance that it may be well to embody them in a series of therapeutical maxims. There are already some maxims generally accepted by ophthalmic surgeons. For instance, *In iritide, collyria stimulantia plus damni quam commodi ferunt,* is a very old one; and there are few practitioners now who are not fully alive to drawbacks to solutions of lead as eye lotions. There is another, a drug in common use even among ophthalmic surgeons which, in my opinion, is much more objectionable than lead lotion. While lead lotion is apt to produce opacities on the cornea from depositions on abraded or ulcerated surfaces, alum, from its solvent action on the corneal cement, frequently gives rise to perforation of the cornea whenever the epithelium is removed by injury or inflammation.[1]

It should, I hold, also be a maxim not to use atropine when the anterior chamber is shallow unless there be unequivocal iritis. A shallow chamber with a semi-dilated pupil and slight increase of hardness absolute contra indicates atropine. Atropine applied to a glaucomatous eye may induce rapid and more or less permanent blindness, whereas eserine may, as a rule, be relied on to give temporary relief, if not occasionally to effect a permanent cure. Again, atropine is essential to the cure of iritis, but eserine would not only aggravate the symptoms but imperil the sight. It becomes, therefore, a matter of as much importance to decide when to abstain from atropine or eserine as when to have recourse to it. Now this is sometimes a matter of very great perplexity and difficulty, only to be safely settled by a critical and methodical analysis of the various symptoms, both objective and subjective, followed by synthetic regrouping. Cases of inflammation of the eye, accompanied with increased hardness of the globe, are not uncommon, in which it is difficult to decide off-hand whether the character of the inflammation is glaucomatous or iritic. In such cases I sometimes have recourse to the expedient of classifying the various symptoms as they fall under one or other of the lists in the following table. No difficulty need arise when the inflammation is not accompanied with increased hardness. Increased hardness is always present during an attack of glaucoma, but is only occasionally a concomitant of ordinary iritis or of Aquo-Capsulitis.

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[1] As these remarks are now destined to reach a wider circle than my classes at University College and Moorfields, it may be necessary to explain that I have not for some years used alum in any form as an ordinary application in conjunctivitis. Over ten years ago I was often surprised to find that apparently simple cases of marginal phlyctenular keratitis went on to perforation of the cornea with prolapse of the iris within a few days. Observation soon satisfied me that this untoward result occurred chiefly, if not exclusively, in cases treated with alum lotion either alone or in combination with belladonna. Thenceforth I used alum very sparingly, and gradually discontinued it altogether. I had almost forgotten the reasons that had originally induced me to refrain from using it, when, six years ago, circumstances threw open to me an entirely new field for the observation of cases under the treatment of other ophthalmic surgeons. Soon I noticed the occurrence of that class of cases with which I had formerly been familiar, namely, rapid perforation of cornea in apparently slight cases of so-called strumous ophthalmia. Again, I was able to trace the accident to the use of alum lotion. Though convinced of the fact, I knew of no satisfactory explanation till about five years ago, when reading the article on the cornea in Stricker's *Histology*, I casually found that solutions of alum are used by histologists to dissolve the cement in making preparations of the corneal fibrillæ. A light was thrown upon the cases of perforation from the use of alum. The alum had dissolved the softened tissue of the ulcer and eaten its way, as it were, through the cornea. Even in conjunctivitis alum should be avoided because the epithelium at the corneal margin is liable to be softened and abraded and thus to give the alum admission to the corneal substance.

The following table records the difference of the chief objective symptoms in the three forms of inflammation. The ophthalmoscopic appearances are not given because, during the acute stage of the inflammation, they are not often available for purposes of differential diagnosis.

| | Glaucoma. | Aquo-Capsulitis *v.* Serous iritis. | Iritis. |
|---|---|---|---|
| Circum - corneal injection . . . | Pronounced, purplish, and chiefly venous. | Slight, and of a delicate pink hue. | Marked, vermilion tint, arterial and venous, often with conjunctival injection. |
| Cornea . . . . . | Steamy, like ground glass, whole surface affected. | Hazy, and dotted at posterior layer and below. | May be unaffected. |
| Anterior chamber | Shallow, practically abolished. | Deep. | Shallower than natural. |
| Aqueous humour | Scanty. | Copious and cloudy. | Turbid. |
| Pupil . . . . . | Dilated and usually oval. | Semi-dilated and circular ; slight adhesions. | Contracted and irregular; adhesions. |
| Iris . . . . . . | Thin, dull, devoid of fibrillæ, and lying close behind cornea, convex forwards. | Tarnished, but not usually entirely devoid of lustre and of fibrillar markings; pushed back and concave. | Swollen, lustreless, discoloured, surface uneven and often nodular. |

In conclusion, I repeat : in glaucoma eserine is indicated ; in iritis atropine ; and in Aquo-Capsulitis, if anything, weak solutions of atropine.

# ROSEOLA AND MEASLES IN MAURITIUS.

BY G. E. PELLEREAU, M.D., M.R.C.S. AND L.R.C.P. ENG.,
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(*Continued from* p. 279.)

*Second Stage.*—The second or eruptive stage then commenced, being characterised by the appearance of the rash; the latter was not always seen first on the forehead and chin, but frequently near the alæ of the nose and round the lips. From thence it spread to the whole face, giving to it at first a marbled or mottled colour, afterwards becoming of a deep red, and complete in that region within twenty-fours. At the same time all the symptoms of the first stage increased, such as the redness of the eyelids and conjunctivæ, the running from the eyes and nose, photophobia, and the swelling of the face.

The eruption in all our cases was first detected on the face, and never on any other parts of the trunk or limbs. Its course and evolution again differed from what is generally observed in Europe.

It seldom covered the whole body within twenty-four hours, but proceeded in an intermittent or jerking way. After it had invaded the face, a moment of arrest was frequently noticed. It then extended to the neck, chest, back, abdomen, and superior extremities. An interval elapsed again before the lower extremities were covered in their turn. This intermission between each appearance of the eruption lasted from twelve to forty-eight hours.

The eruption was more marked on the face and back. It began with minute red papules slightly elevated above the level of the skin, more or less disseminated at first, and increasing afterwards so as to coalesce and form crescents or segments of circles. In some regions healthy pieces of skin were seen between the crescents and limited by them. In others the eruption was so confluent that it gave rise to large uniformly elevated patches of a claret colour. It was sometimes scarcely elevated above the surface of the skin, and sometimes considerably so. It was rough to the touch, and never completely disappeared under pressure in white people. Among dark people, on the other hand, although the examination looked at first sight rather difficult, yet we must state that it was not really so to an experienced practitioner. The papules and segments of circles could be distinguished, especially when they were prominent. The other symptoms were, moreover, a sure guide to the diagnosis.

When minutely examined with the magnifying glass, each crescent was found to consist of two distinct parts. One central, more or less conical, and the other smooth, flattened, or slightly raised. When a large patch was, on the other hand, looked at in the same way, dark red depressions and elevations could be seen on its surface, whilst its contours were more or less irregular and jagged.

The eruption was often more or less mixed with prickly heat which communicated to it a most curious appearance. The latter, however, was easily recognised on account of its vesicular form. In that case the prickly heat covered both the segments and the healthy pieces of skin.

Sudamina were of frequent occurrence; they were met with on the face, neck, chest, and abdomen, especially, not only accompanying the eruption but succeeding it. We were more than once quite surprised to find in some of our patients, after the rash had completely disappeared, the above-mentioned regions to be covered with such an amount of sudamina or prickly heat that they felt alarmed, believing it was a relapse of the disease.

It was further easy to differentiate between prickly heat and sudamina, the former appearing in clusters, formed by minute vesicles on a slightly elevated red basis, whilst the latter consisted of larger and more transparent vesicles developed without any basis at all.

When all the foregoing symptoms were well marked, there was not the slightest difficulty in diagnosing the disease.

The patient was then more or less prostrated and restless. His skin was hot, dry, and itchy or burning. There was slight headache, but the chief complaint was about the throat, which was of a deep red colour and mottled in appearance. The tonsils were more or less enlarged. Swallowing was painful. The eruption did not exist only in the throat, but was seen to cover also the palate. The tongue, which in the first stage was thickly furred in its centre and red at its tip and edges, changed. The fur was found to diminish gradually, allowing the hypertrophied and red papillæ to protrude, and thus assuming a most characteristic appearance Finally the fur disappeared completely, leaving the tongue of a bright red colour.

Vomiting was not uncommon in this stage, and sometimes very severe. Diarrhœa also was of frequent occurrence, serous or bilious, and even in serious cases amounting to dysentery.

In many cases delirium was present, at night especially, excepting when the disease was intense; it then occurred also in the day.

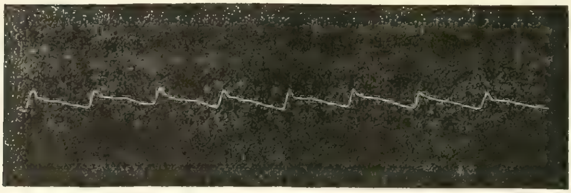
Convulsions were frequently noticed, not serious at the beginning of the disease, but indicative of a fatal result at the end of this stage.

There were also deafness, dyspnœa, and intense thirst. The respiration seldom reached beyond thirty in a minute, except, of course, in cases complicated with pulmonary inflammation.

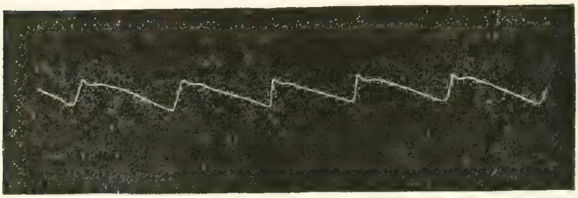
Bronchitis was very common during this period. It was sometimes more marked on one side than on the other, but generally râles were first heard at both bases, and thence spread all over the chest.

The lymphatic system also suffered, and the glands of the neck, armpits, and groins were often found enlarged and painful.

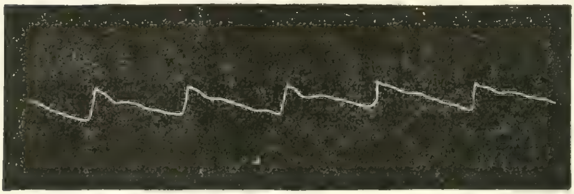
The pulse was frequent, 100 to 140, hard and bounding, or weak and depressible. Taken with the sphygmograph it showed the characters generally met with in malarial remittent, as the following tracings will prove:—



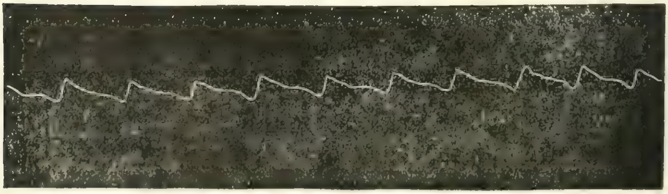
A.—Pulse of a boy, 12 years old, in the eruptive stage of measles.
*No quinine given.*



B.—Pulse of the same boy during the period of desquamation.
*No quinine given.*



C.—Pulse of an adult during the eruptive stage of measles.
*No quinine given.*



D.—Pulse of an adult in malarial remittent.
*No quinine given.*

All these patients had an enlarged spleen. We therefore give these tracings as an illustration of the powerful influence of malaria over the economy and of the persistence of its influence in the course of concomitant diseases.

It will be seen that in the eruptive stage the ascending line is slightly oblique and ends in an acute angle, as is frequently the case in Mauritius. Then the descending line goes down slowly with a dicrotic or tricrotic character. It is exactly the same in malarial remittent.

In the stage of desquamation, that is after the fever is over, the amplitude of the pulse is seen to be greater, being represented by a longer vertical line. The apex, in the second place, instead of being a well-defined acute angle, as in the first tracing A, exhibits a plane showing a well-marked diminution in arterial tension.

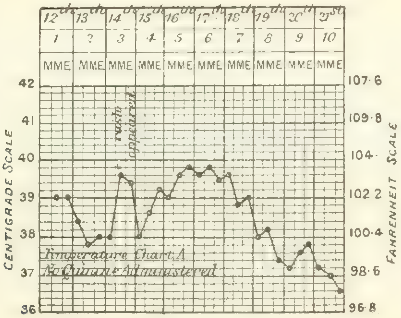


Chart A.

Such characters, however, we must insist do not properly belong to our measles, but are the results of a malarial constitution. They are, therefore, constantly met with in Mauritius.

The temperature is also in this stage of very great interest. As we stated before, it frequently reached here its acme, and after fluctuating between 38° C. and 40° C. went down in the period of desquamation, the remission occurring generally in the morning. But this, however, was not always the case. It happened also that the maximum temperature was observed in the first and not in the second stage. There was besides an important feature in the thermometric cycle at this period of the disease which it is necessary to point out. The temperature, after the rash had appeared on the face, went down to a little above normal, that is 37°·6, 37°·8, or 38° C. (*vide* Chart A), in the morning to rise again and reach 39° or 40° C. When, on the other hand, it fell down at the end of this stage, it was either by defervescence (Chart B), or by lysis (Chart A). The fever never assumed at that time the intermittent type.

The blood, examined microscopically, revealed nothing beyond the usual alterations met with in malaria. The same may be said of the secretions or excretions, with the exception of the urine, which presented some important phenomena. The specific gravity was from 1·020 to 1·028. It contained no albumen, but now and then a trace of sugar, as is often noticed in malarial remittent. The most remarkable fact with regard to it was the diminution or absence of chlorides during the second stage, and their increase or reappearance during the period of desquamation as soon as the patient felt better. When this decrease or absence persisted, it was a sign of serious complication.

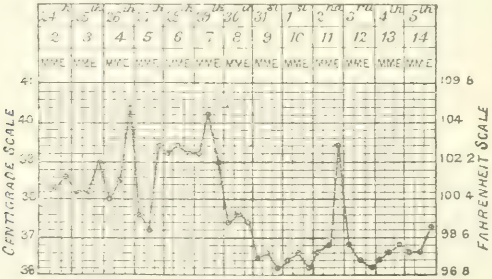


Chart B.

On the 5th day the rash appeared and desquamation occurred from the 8th to the 11th.

The eruptive stage lasted generally from three to eight days, beginning and ending with the rash.

*Third Stage*, or stage of Desquamation.—As soon as this stage began the patient felt relieved, all the foregoing symptoms abating. The skin became cool and moist, the pulse slow and regular, the tongue good, the face pale. Restlessness at night was replaced by a sound and refreshing sleep. Appetite returned, and very often was excessive.

The only symptoms which persisted were those of bronchitis, which in normal cases subsided gradually, and in severe cases, or in weak and debilitated constitutions, passed on to broncho-pneumonia.

The temperature went down to normal or below normal. It was frequently observed to rise again and reach 38° or 39° C. (*vide* Temp. Charts), then fall down exactly as in malarial remittent, so often followed by a quotidian in our island (*vide* Temp. Chart D).

Desquamation was generally almost insignificant. In a few cases only the skin peeled off in large patches on the whole body, but in the majority of our patients it was only noticed on the face, especially near the alæ of the nose, on the chin, and round the lips.

It sometimes happened that there was in this stage intense prostration amounting to fatal collapse without any organic lesions. This was noticed amongst the malarial cachectics.

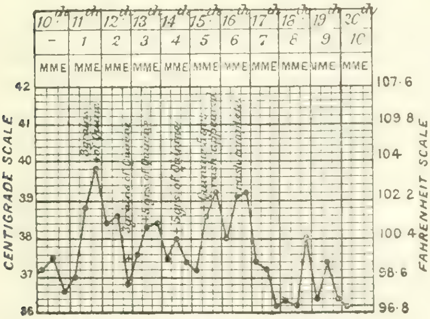


Chart C.

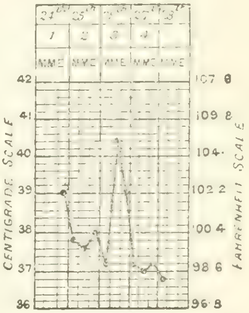


Chart D.

Suddenly the patient was seen to faint or to be covered with a cold clammy perspiration continuing for hours or even several days, together with slow pulse and breathing.

The urine presented its normal amount of chlorides, and its specific gravity fell down from 1·020 or 1·028 to 1·010 or 1·019.

The third stage lasted about six or seven days, so that the whole duration of measles was from ten to twenty-five days in simple uncomplicated cases.

### *Complications and Sequelæ.*

It was principally in the second and third stages of the disease that complications were met with. Apart from those observed in Europe, there were others besides peculiar to the climate and belonging also to malaria. It may be stated that all the complications and sequelæ of measles which are described in classical books were of frequent occurrence during our epidemic. They were otitis, conjunctivitis, keratitis, gangrene, abscess, furuncles, anthrax, diphtheria, bronchitis, broncho-pneumonia, œdema glottidis, dysentery, &c., &c. Of these, some were much more severe than in cold or temperate regions, on account of the sudden atmospheric changes so frequently noticed in Mauritius, and more particularly on account of the tendency to suppuration or mortification observed among malarial cachectics. Bronchitis, broncho-pneumonia, and dysentery were no doubt of the greatest intensity, and deserve therefore in that respect a special description.

### *Bronchitis, Broncho-Pneumonia, Tubercular Diathesis.*

Bronchitis was, as above stated, a common complication or sequela of our measles. In the majority of cases it began in the second stage and persisted during the period of desquamation or even long after. The first physical signs were observed at the bases, sometimes one after the other, or both simultaneously. They very frequently extended from there to the apices. In other cases the whole bronchial tubes were affected all of a sudden, accompanied with wheezing, dyspnœa, cough, and the characteristic nummular sputa.

Bronchitis by itself was not a dangerous complication except in debilitated or predisposed constitutions, where it easily passed on to broncho-pneumonia or brought on the development of tuberculosis.

Broncho-pneumonia once well marked was always fatal. The first symptoms which attracted the attention of the medical practitioner were fits of dyspnœa occurring during the night, at first intermittent and lastly permanent. Percussion and auscultation revealed the physical signs usually met with in this dreadful disease. The temperature, like the fits of dyspnœa, was another warning of approaching danger. It rose to 40° or 41° C., or even 42° C., the pulse being 130, 140, 150.

Broncho-pneumonia was not only prevalent among children but also among adults.

Our epidemic gave rise to a great many cases of phthisis, either producing them in a direct way, or hastening to a fatal termination the disease already existing. Pulmonary phthisis, as is well known, is exceedingly common in tropical climates, notwithstanding the pretended antagonism which M. Boudin, a French practitioner, tried to establish between tuberculosis and malaria. It is therefore quite rational to admit that measles prevailing in such conditions should have necessarily urged on the course and development of so serious a morbid lesion.

*Dysentery.*—This complication or sequela was in many cases of a most severe character. It was met with in an acute or chronic form, and sometimes persisted in spite of energetic treatment, owing no doubt to its being favoured by the climate.

Next to the above-mentioned complications and sequelæ, generally observed in most epidemics, there were others of special interest, inasmuch as they are seldom seen in Europe, and seem properly to belong to tropical regions. They are—(1) Congestion of liver and hepatitis; (2) Ataxo-adynamic measles; (3) Malarial fever.

### *Congestion of Liver and Hepatitis.*

Both ushered in suddenly with their usual symptoms: pain in the right shoulder, pain and tenderness in the right hypochondrium or epigastric region, vomiting, icteric tint, furred tongue, and shivering. In some cases they were preceded by dysentery and in others not.

Mere congestion of the liver always ended favourably, but it was not precisely the same with hepatitis, which either got well or was followed by fatal suppuration. The fact of abscess of liver being consequent on measles shows in a most positive way the amount of disorder the latter disease is liable to produce in hot climates, and at the same time the frightful predisposition of the population to the suppurative process.

Whatever may be the intimate cause of such a predisposition, it is to be remarked that it was met with among children especially. The following observations, which we give as briefly as possible, will initiate our readers into the pathology of Mauritius.

Martha F. was taken ill with fever on the 25th of March, 1883. Three days after the beginning of the fever the rash appeared on the face, and gradually covered the whole body.

On the 5th of April desquamation took place, and the fever instead of abating persisted. Symptoms of dysentery soon set in, though not severe. The stools were slimy and sanguinolent, and there was at the same time great pain and tenderness of the abdomen. The liver became enlarged.

On the 8th of April, on examination, a bulging, at first slight and afterwards most marked, was detected in the right hypochondrium. No fluctuation could yet be perceived.

On the 10th of April the liver was much more enlarged, and deep fluctuation felt. The dysenteric symptoms continued.

On the 12th of April the child was put under chloroform and operated on with Dieulafoy's aspirator. The operation was not borne well, the little patient looking weaker.

On the 14th of April a second operation was done, and, as at the first time, three or four ounces of pus mixed with blood were withdrawn.

On the 17th of April another operation was again performed with the same instrument, and an equal quantity of pus and serosity evacuated. After this, Martha F. gradually sank, and died in convulsions. *She was only four and a half years old.* The disease and its complications, dysentery and abscess of liver, *lasted twenty-four days.* There was no necropsy.

*Ataxo-adynamic or Typhoid Measles.*—This form was not uncommon, and was particularly seen amongst those who had previously been labouring under malarial cachexia. The fever, before or after the rash disappeared, assumed a typhoid character, being attended with the following symptoms: dry and brown tongue, sordes, sub-delirium, jactitation, quick and weak pulse, picking at the bedclothes, followed by death.

All the cases were not, however, fatal, as a great many recovered most unexpectedly.

*Malarial Fever.*—With regard to this complication we shall not insist too much upon it here, as we tried our utmost, when describing the symptomatology of measles, to show its remarkable influence over the latter. The temperature ranges, the course of the fever and the development of the rash, together with the nature of some of the most dreadful complications, amply prove in our mind this fact beyond all doubt. The clinical history of this epidemic reveals at least a most important phenomenon—that the same diseases vary, according to climate and locality, not unlike human races.

*Diagnosis.*—After the above description of roseola and measles as they occurred in Mauritius, it is easy to understand that it was possible to distinguish one from the other. We were enabled further to verify minutely and mathematically the theory of specificity through the predisposition conferred by roseola to measles, and to see it strongly supported by the most precise elements of diagnosis. It resulted indeed from the two epidemics that they are two separate diseases, and that there cannot be concerning them the slightest confusion.

The following table will point out the characteristic differences between each exactly as it was given to the Mauritius practitioners to observe them:—

| ROSEOLA. | MEASLES. |
|---|---|
| Fever often absent, and, if present, always assumed the remittent type. | Fever always present, assuming the remittent or the intermittent type. |
| The rash appeared either with the fever, or from two to eight days after it had begun, or again after it had completely ceased. | The rash appeared generally from three to six days after the beginning of the fever. |
| The temperature fell down when the rash appeared. | The temperature rose on the appearance of the rash. |
| The temperature or fever was reduced by the use of quinine. | Not amenable to quinine. |
| Scarcely any coryza. | Coryza well marked. |
| No laryngitis or bronchitis. | Laryngitis or bronchitis. |
| No photophobia. | Photophobia. |
| The rash appeared first on various parts of the body. | Began, in the majority of cases, on the face. |
| No prostration. | Great prostration. |
| No visceral lesions or complications. | Visceral lesions and complications. |
| No sequelæ. | Sequelæ. |
| Never fatal. | Fatal in many cases. |
| Characters of the rash: scarlatiniform or morbilliform, or more or less fugacious and disappearing under pressure. | Rash persistent, elevated above the level of the skin, not disappearing completely under pressure, and consisting in crescentic patches with pieces of healthy skin between. |

*Prognosis.*—This epidemic was less severe than the one which visited Mauritius in 1872-73. As is usually the case, death was due to complications or sequelæ. We registered in our practice out of 108 cases six fatal, which were as follows :—

| | |
|---|---|
| Male adult, æt. 45 ... | Broncho-pneumonia. |
| Male adult, æt. 29 ... | Typhoid measles. |
| Female child, æt. 12 | Typhoid measles. |
| Female child, æt. 4½ | Abscess of liver. |
| Female adult, æt. 26 | Broncho-pneumonia passing on to acute phthisis. |
| Male child, æt. 10 ... | Broncho-pneumonia. |

The disease was more severe among adults than among children, and of these many below one year suffered. Out of 108 cases 47 were above 16, 57 below 16, and 4 at 16.

Of the 57 below 16, 3 were below 1, 9 between 1 and 5 years, 45 between 5 and 16. We give here, of course, the results of our own observations.

The disease was more frequent among the males than among the females. Of our 108 cases, 69 were males and 39 females. Of these, again, two were at seven months of uterine gestation when they had measles. They both terminated their full period without any accident or complication. Among the female adults some had their menstruation suppressed or retarded, but in most of them it may be said to have been in advance.

*Treatment.*—The treatment was very simple in normal cases, as it was merely expectant. We had to interfere only when they were attended with complications. The drugs then used were those generally mentioned in all classical books. With regard to quinine, it was but seldom we had recourse to it during the second or eruptive stage. It occurred sometimes that it was administered in the first stage when the usual symptoms of measles were not present, but in that case it was, of course, without effect, the fever persisting notwithstanding. It was undoubtedly in the stage of desquamation, when malaria complicated it, that the alkaloid succeeded in checking the various types which were more or less obscured as the quotidian or tertian.

Emetics were now and then used, and we had to abstain completely from purgatives on account of the frequency of diarrhœa or dysentery. To meet these, manna proved most efficacious.

Against complications or sequelæ various treatments were employed.

We tried in several instances to give quinine. As we stated above, the course of the disease was in no way modified, but the temperature range contrasted with that observed in cases where no quinine was administered (*vide* Temp. Chart E). General hygienic measures were taken from the very beginning of the epidemic so as to prevent as much as possible its propagation, but they were all quite useless, and as unnecessary as the sanitary rules and regulations which our General Board deemed it expedient to issue.

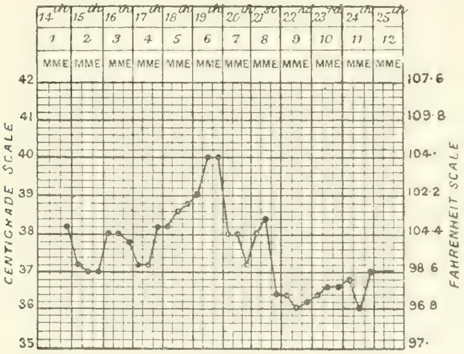


Chart E.

# MARSH MALLOW IN PALMAR PSORIASIS.

BY F. C. BERRY, B.A., M.D., LYNTON, N. DEVON.

In all country districts, but more especially in one which is situated twenty miles from the nearest railway station, the regular medical man has to contend with a host of amateurs, generally old women, who consider themselves, and are, by virtue of their age and experience, held by their neighbours to be learned in the healing properties of the herbs indigenous to the locality.

In most cases their remedies are worse than useless, but frequently the orthodox practitioner, if he will condescend to give some attention to the various medicaments of their traditional pharmacopœia, will thereby add considerably to his stock of therapeutical knowledge. These worthies consider diseases of the skin to be their grand specialty, in fact one of my patients once calmly hinted that doctors, even the most celebrated of them, knew very little about the treatment of these complaints. They divide the whole subject of dermatology into two classes in accordance with what they consider the etiology of the disease. Thus we are told one man is suffering from "inflammation or over-heated blood," and another has a "chill in the blood," both these conditions becoming manifest externally as a disease of the skin.

The case which drew my attention to the value of some of their applications, and which I have taken as the text for this short paper, was one of palmar psoriasis of long standing and unusual obstinacy to treatment. The patient was an old man, aged sixty-five. He had been an invalid suffering from chronic bronchitis and weak (probably fatty) heart for some years, but had not noticed anything the matter with his hands till about eighteen months previous to his consulting me. There was no history of syphilis. The palm of his right hand presented the usual appearances characteristic of the disease. The integument was hardened and thick, and from off its surface glistening white scales could easily be removed. In some places it was corrugated and fissured. Extension of the fingers would cause the cracks to bleed. The dorsal surface of the thumb was also affected. The symptom he complained of most was the intense itching, which no application seemed to relieve.

I prescribed Fowler's solution in three-drop doses three times a day, ordered him to wash his hand well with soft soap night and morning, and then to apply an ointment composed of chrysophanic acid and vaseline. This treatment was continued for some weeks, but did not appear to produce any marked improvement. I then tried in turn oil of cade and vaseline, ammoniated-mercury ointment, and Wright's liquor carbonis detergens as a lotion. None of these measures were successful. The old woman then appeared on the scene, informed me it was due to a "chill in the blood," and that she had seen similar cases cured by marsh mallow ointment. I doubted its efficacy, but willingly allowed my patient to try it. The first application relieved the irritation, and in a month the skin of the hand had almost regained its natural appearance. I should add that she was pleased to approve of the washings with soft soap, and this was continued while applying the ointment, but the internal administration of arsenic was stopped. The disease appeared again in a short time, but a fresh application of the ointment cured it at once.

The *Althæa officinalis*, or marsh mallow, belongs to the natural order *Malvaceæ*, and is to be found growing plentifully in most European countries. On the Continent, especially in France, it is highly esteemed for its demulcent properties. Both the leaves and roots are used, and are given internally for various affections of the mucous membranes. A favourite remedy in France for sore throat is *pâte de guimauve*, which is a kind of lozenge made with mucilage of althæa, gum-arabic, sugar, and white of egg. Recipes for a decoction and syrup of althæa were to be found in the old London pharmacopœia. In this part of the country the ointment is the favourite preparation, and is made by cutting the fresh leaves into small pieces, stirring them together with lard, and boiling the mixture for half an hour, after which process it is strained through muslin or through a common kitchen strainer, and is then ready for use. The exciting cause which produces psoriasis still remains involved in much obscurity. It is generally supposed to be due to some constitutional peculiarity—a term, however, which, I think, conveys to us little more meaning than the old woman's idea of it as a "chill in the blood." Willan described this constitutional condition as characterised by "a slow pulse, or a languid circulation of the blood, and, what must be generally connected with it, a harsh, dry, impermeable state of the skin and cuticle." Wilson and Fox believed the cause of it to be a special poison, the nature of which is obscure, but they are satisfied it is originally syphilitic. Most dermatologists are agreed as to its hereditary character.

In all cases of psoriasis which have assumed a chronic form arsenic and carbolic acid are the drugs which are generally administered internally with good results.

Dr. McCall Anderson has seen much benefit derived from the use of carbonate of ammonia in doses increasing from ten to forty grains. The alkaline treatment, consisting of liq. potassæ in twenty-minim doses three times a day, has found favour with some writers.

# A STUDY OF THE THERAPEUTICS OF THE RESPIRATORY SYSTEM.

BY J. MITCHELL BRUCE, M.A., M.D., F.R.C.P. LOND.

## I.

In this article it is intended to represent in a methodical fashion the principal facts connected with the treatment of diseases and disorders of the respiratory system. No attempt will be made to bring forward new lines of treatment, but the principles of treatment will be placed before the reader in a more definite order than appears to be generally done. If no further advantage be derived from this discussion, it may at least enable the practitioner to submit his own opinions of the proper employment and value of a large number of measures to something approaching scientific analysis, and afford him clearer and fresher views of the *modus operandi* of familiar drugs.

With respect to the plan of studying the rational therapeutics of this or of any of the other great systems of the body, it seems to be best (1) to begin with a brief *résumé* of its physiology; (2) to discuss fully the pharmaco-dynamics of the part; (3) to sketch in a general way the principal diseases of the system which call for treatment; and (4) to discover, if possible, the means of natural recovery, which the art of the therapeutist will attempt to bring into play, and from which he must take suggestions for treatment. Thereupon (5) the rational therapeutics of the disease will be a scientific necessity. This division of the subject is based upon the following analysis of the meaning of treatment.

It appears to the writer that four conceptions are included in the words *Therapeutics* and *Treatment.*

First, there is a *physiological* conception, the conception of *health* or "the normal," from which the organ or system has departed, and to which it has to be restored. Health is the physiological result of a vast number of influences, conditions, or circumstances, under which the organ or system has reached its present condition of evolution, and now exists—so-called *intrinsic* and *extrinsic* influences. Secondly, there is a conception of a *power* of *interfering*, on the part of the practitioner, with the influences or conditions of life, and thus of interfering with or modifying life itself. This is the power of "acting physiologically" upon any organ by means of food, air, temperature, drugs, &c., and may be conveniently called *pharmaco-dynamics.*

Thirdly, there is a *pathological* conception—the conception of a morbid state into which the organ or system has passed from the normal, and from which it is to be restored to the normal. Disease or disorder is the pathological result of the action of influences different either in degree or in kind from those which produce and maintain health.

Fourthly, there is a conception of *natural recovery.* Nature can meet many morbid influences, and overcome them in various ways, *e.g.* by expelling them (vomiting, purging, &c.); by an increased amount of reaction to them, including compensation by hypertrophy, as in the heart; by means of regulating mechanisms, as in the body-heat; by vicarious action, and so on. If compensation and reaction fail, and disorder have actually occurred, an organ will still—within certain limits—return to the normal and continue in it, if the morbid influences are withdrawn. Thus, if narcotism be produced in an animal by morphia, the symptoms do not continue indefinitely, but disappear with the removal of the poison. This seems to be the proper statement of the great principle of the *vis medicatrix*, which, as Dr. Oliver Wendell Holmes says, enters in some form into every system of therapeutics. It is here that the healing Art finds at once its model and its opportunity. Unfortunately, there is a limit to natural recovery, and therefore a limit to treatment.

Fifthly, the therapeutics of any diseased state follows rationally from these four considerations. Treatment may be purely *empirical*, but it is daily becoming more *rational*, as our knowledge of physiology, pharmaco-dynamics, pathology, and nature's ways of recovery, advances. In any given instance of treatment, we bring into the field every particle of knowledge we can command, respecting the normal and abnormal states of the organ involved, the influences which may be brought to bear upon it, the extent and limits of the power of natural recovery which it enjoys. It would be beyond the purpose of an article on pharmacology to enter fully into the physiology proper, much less the pathology, a knowledge of which must be assumed; but a discussion of therapeutics involves in every sentence some reference to disease, and it will therefore be more satisfactory to refer to both the normal and the abnormal relations of the respiratory system in their proper order.

## I.—Physiological Relations.

Respiration, or breathing, is a great double function of oxygenation and excretion. The first and greater part of the function, as commonly understood, consists in the admission of oxygen into the lungs, and the discharge of carbonic acid, water, and heat, and is called external respiration; whilst in the second part of the process, which is called internal respiration, the oxygen having been conveyed by the red corpuscles, combines with the tissues, from which the carbonic acid is set free.

In briefly reviewing the physiological relations of respiration we must separate distinctly the two parts of the function, oxygenation and excretion.

(A.) *Oxygenation.*—The *red corpuscle* of the blood is the oxygenating or respiratory element of the body; this does not require discussion here. The physical part of respiration is carried on by means of a pneumatic mechanism called the *chest,* and the *respiratory passages.* By alternate inspiration and expiration, the air is continually renewed in the lungs, a fresh supply of oxygen presented to the red corpuscles, and carbonic acid, water, and heat given off from the plasma.

The red corpuscle and the chest are brought into functional relation with each other by means of a special nervous mechanism, called the *respiratory centre,* a portion of nervous matter in the medulla oblongata, which is peculiarly irritable in the presence of oxygen and carbonic acid.

When the oxygen in the arterial blood of the part is of a particular quantity, the respiratory centre is active, and discharges its force rhythmically, sending impulses downwards through lower centres in the cord to the nerves supplying the muscles of respiration, especially the diaphragm, intercostals, muscles of the abdominal wall, back, and neck, and the muscles of the nostrils and larynx.

Now the force of the nervous discharge of the centre, and thus of the muscular movement of the respiratory organs, is in inverse relation to the amount of oxygen in the blood. The less the amount of oxygen admitted to the respiratory centre, the more powerfully it is stimulated and the mechanism of the chest moved.

The greater the amount of oxygen admitted to the centre, the less powerful its discharges, and the more weak or superficial the breathing.

By the admission of a large amount of oxygen to the centre, the stimulation may even cease, so that no motor impulse is sent down to the muscles of the respiratory passages and chest. By cutting off the supply of oxygen to the centre altogether, it is so powerfully stimulated that the muscles of the chest and body generally are violently convulsed.

Now the amount of oxygen in the blood of the arteries of the medulla is the same as in the systemic arteries generally, and we thus find that the state of oxygenation of the arterial blood governs the respiratory movements, through the respiratory centre. The fundamental canon in the physiology of respiration is that *the condition of the red corpuscle is the prime mover of all respiratory acts.*

The term respiratory "centre" applied to the special nervous area in the medulla, implies that certain influences meet in this point, originating in a circle of which it is the middle point; and this is the case. Falling into the respiratory centre are impressions conveyed by afferent—usually sensory—nerves, from every part of the body, modifying its activity, and reflexly influencing the respiratory movements. Thus sneezing is caused by irritating the fifth nerve in the nose, or the second nerve in the retina (gazing at the sun); and the breathing responds to irritation of the surface of the body, especially by cold. Mental conditions also powerfully affect the respiratory centre, whence laughing, sobbing, &c. Of all afferent nerves to the medulla, those coming from the respiratory organs through the vagus are peculiarly capable of stimulating the centre; thus irritation of the larynx immediately causes the reflex respiratory act called cough. The vagus is therefore said to be the special afferent nerve of respiration; indeed, the whole surface of the respiratory passages, and probably the lungs, are abundantly supplied with rootlets of the vagus, which are incessantly collecting impressions, and transmitting them through the vagus to the respiratory centre. Every change in the distension of the lungs, and in the quantity and quality of the pulmonary blood, thus instantly tells on the respiratory movements. Inspiratory impressions originate chiefly in the lungs, expiratory impressions in the larynx; but inasmuch as the force and frequency of the respiratory movements are so modified by the reflex activity of the centre as not to alter the total amount of respiratory work done, we consider this mechanism to be regulative only, and that the respiratory centre is regulated by these impressions travelling up the vagus, just as the ganglia of the heart are regulated by the impressions travelling down the vagus.

The respiratory centre has another intimate connection. Diminished oxygenation of the blood, whilst increasing the respiratory activity, stimulates also the other two great centres in the medulla, increasing the arterial resistance through the vaso-motor centre, and slowing the heart through the cardiac centre.

The afferent impressions from the lungs and respiratory passages besides falling into the respiratory centre, reach, if sufficiently powerful, the convolutions also, where they are felt as various *sensations,* referred, more or less accurately, to their seat of origin in the respiratory organs. In health these sensations of common sensibility are exceedingly feeble; and we do not appreciate them until they are converted into sensations of pain, oppression, distress, irritation, tickling, &c., in disorder or disease.

Amongst the *respiratory muscles* one group demands special notice, viz. those distributed to the bronchi. These are motor filaments of the vagus, which originate in the respiratory centre and supply the muscles regulating the calibre of the air-tubes. They bring the bronchi under the control of the medulla, and thus of the afferent impressions, especially of those very impressions which arise from the respiratory passages, the seat of their own distribution.

(B.) *Excretion.*—The air of expiration which has lost a certain percentage of oxygen, proves to have gained about an equal volume of carbonic acid gas, which has been given off by the blood from a loose combination with the liquor sanguinis. Carbonic acid does not appear to have any direct effect on the respiratory centre like want of oxygen. The whole of the expired air is also saturated with the vapour of water ; and heat is freely lost from the pulmonary blood.

## II.—Pharmaco-Dynamics.

The extensive relations of the respiratory organs to the external air, to the blood and circulation, and to the nervous system, afford us abundant means of influencing their mode of action at our pleasure. These means we will now review in their natural physiological order :—

1. *The air.*—The air which comes in contact with the organs of respiration may be altered in five different respects, each of which will have a physiological effect upon the oxygenating and excretory functions of the lungs, viz. as regards (1) its *absolute amount*, (2) its *chemical composition*, (3) its *temperature*, (4) its *moisture*, and (5) its *pressure.*

(1) The supply of air, like that of the food, may be entirely *arrested* for a time, another gas with different physiological properties, such as nitrous oxide, being allowed to take its place. Or the amount respired may be simply *reduced*, by administering rarefied air ; or *increased*, by admitting oxygen or compressed air into the lungs. The same effects may be produced by ordering little or much muscular exercise respectively.

(2) The *chemical composition* of the atmosphere, physiologically speaking, relates only to the amount and quality of the oxygen. Impurities concern the pathology of respiration ; and the conveyance of medicinal substances into the respiratory passages and lungs by the medium of the inspired air will be separately

noticed. The proportion of oxygen to nitrogen in the air might be modified by arrangements for special inhalation, but practically this is seldom attempted, mountain and ocean climates affording us a much more satisfactory supply of pure air.

(3) The *temperature* of the air respired may be modified either by selecting particular climates—tropical, sub-tropical, temperate, or cold; by artificial regulation of the atmosphere of the room (ventilation, heating, &c.); or by arrangements for warming or cooling the ingoing current of air only, by means of so-called "respirators," and by enforcing nasal breathing only, or oral breathing only, as the case may be.

(4) The amount of *moisture* in the air respired can be altered at pleasure, whether by residence in a dry climate or in a moist climate, or by varying the amount of watery vapour in the air of the room, or in the individual inspiratory draughts (steam-kettles, hot water inhalations, &c.).

(5) Lastly, the *pressure* of the air is completely under our command; and this again either by means of climate (elevated mountain residence), or by local artificial arrangements such as the air-bath and pneumatic apparatus.

The *compressed air-bath*, at a pressure of $\frac{1}{5}$ to $\frac{1}{2}$ of an atmosphere above the normal, increases the amount of oxygen admitted into the blood, as well as the vital capacity and the size of the lungs, whilst it renders respiration less frequent and more easy. A rarefied atmosphere is never given as a bath; on elevated mountains it increases the depth and frequency of respiration, and the vascularity of the lungs, so that there is a tendency to hæmorrhage from the alveoli.

The *pneumatic apparatus*, a small gasometer, admits air under artificial pressure to the respiratory passages only, the patient breathing into, or out of, a valved tube connected therewith.

Inspiration of air compressed by about $\frac{1}{50}$ atmosphere increases the amount of air entering the chest, and eventually the vital capacity, the size of the chest, and the respiratory force, whilst it diminishes the vascularity of the lungs and raises the arterial pressure. The other methods of so-called aërotherapeutics hardly require mention here.

2. *The red corpuscle.* — The red corpuscle being the great medium of external and internal respiration, as well as the

prime mover of the respiratory centre, is an all-powerful agent in our hands, in connection with the lungs. We have abundant means of modifying the number and quality of the corpuscles, by food, drugs, and all the ordinary natural influences.

3. *The circulation.*—The corpuscles must be circulated by the heart and vessels, and any effect that we may produce upon these will modify the respiratory functions. The pharmacodynamics of the circulation need not be discussed here.

4. *The lungs and air-passages.*—(*a*). *The afferent or sensory nerves* of the respiratory organs may be stimulated by cold and dry air, by chlorine gas (which is, however, never used for this purpose), and by a great and valuable group of the materiæ medicæ, viz. ipecacuanha, senega, tobacco, nitre fumes, ammonia, and antimony. They are *depressed* or soothed by warm and moist air, warm food, warm applications to the chest wall; possibly by demulcent substances to a small extent; and by an important group of drugs, viz. opium, chloral, chloroform, and ether.

(*b*). *The vessels of the bronchi* may have the circulation through them *increased* by all measures which increase the activity of the circulation generally, viz., by purgation, exercise of the lungs, and bodily movement; and amongst drugs, by digitalis, scilla, ammonia, alcohol, strychnia, and probably the whole series of aromatic oils to be presently noticed. *Per contra*, the bronchial circulation may be *depressed* by all cardiac and vascular depressants, including heat, alkalies, iodides, aconite, antimony, and ipecacuanha.

(*b′*). *The pulmonary circulation* bears very complex relations to the respiratory movements, as regards the pressure and rate of flow in inspiration and expiration, ordinary and extraordinary. Manifestly, as regards the general circulation, the pulmonary vessels may be modified by every influence which affects it, such as blood-letting, transfusion, purgation, a variety of drugs, and muscular rest or exercise. We possess one substance, non-officinal, which specifically contracts the pulmonary vessels, namely muscarin, the active principle of the mushroom.

(*c*). *Glands of the bronchi.*—The secretion of bronchial mucus may be *increased* by alkalies, especially ammonia, by iodine, sulphur, and antimony, by ipecacuanha, senega, tobacco, scilla, and the great group of aromatic essential oils, oleo-resins and balsams, including turpentine, camphor, benzoin, copaiba, ammoniacum, and the balsams of Peru and Tolu. Warm liquid food remarkably increases the bronchial secretion; on the contrary, cold dry food *diminishes* the bronchial mucus, possibly belladonna and its allies, and certainly acids.

(*d*). *The nervo-muscular structures* of the bronchi are affected by a great variety of measures, including all those which act upon the afferent nerves (*a*); but it is doubtful, and perhaps of little practical importance, how far the motor nerves and muscular fibres can be *directly* influenced. Ipecacuanha, senega, tobacco, and ammonia may possibly produce such a direct, as well as an indirect stimulation, and consequent narrowing of the respiratory passages, of brief duration.

A group of substances of great pharmacological interest directly *depress* the same system, and so relax the bronchial walls and favour the movements of the respiratory air, viz. belladonna, stramonium, hyoscyamus, lobelia, and tobacco; opium, chloral, and cannabis indica; chloroform, ether, and amyl-nitrite, conium and warm moist air.

5. *The afferent nerves to the respiratory centre and sensorium.*—An important group of measures acting through this channel has just been enumerated, viz, those which influence the branches of the vagus originating in the lungs and bronchi, whether irritants or sedatives. It is of the first importance to note that *sensations* connected with the respiratory organs may be modified by the same means, the nerve-depressants thus proving to be pulmonary anæsthetics or anodynes, as well as interfering with reflex respiratory acts.

The second great group of afferent impressions, reaching the respiratory centre through *other channels than the vagus*, afford us a remarkably ready means of affecting it, and through it the chest. Impressions may be *stimulating*, including irritation of the fifth cranial nerve in the nose by ammonia, or by cold to the brow; of the olfactory nerve by odoriferous substances; of the optic and acoustic nerves by powerful light and sounds respectively; and of the nerves of the skin generally by painful impressions, such as flicking with towels, flagellation or slapping, extreme heat, mustard plasters, and other powerful local irritants. Or we may use measures with a *sedative* influence on the respiratory centre, including gentle warmth to the surface of the chest in the form of poultices and fomentations, warm baths, and local anæsthetics or anodynes, such as plasters and liniments of opium, belladonna, and essential oils (turpentine, camphor, &c.) applied to the chest-walls.

6. *The respiratory centre.*—Besides the number of afferent impressions, a variety of *direct* stimulants and depressants of this centre are in our possession. The force of the nervous discharge may be *increased* by ammonia, strychnia, belladonna, stramonium, and hyoscyamus; probably by ipecacuanha and antimony temporarily; and by alcohol, ether, and chloroform for a brief period at the commencement of their action. On the other hand, the last-named drugs quickly *diminish* the force of the respiratory centre (ether less quickly than the others); and the same effect may be produced at will by means of chloral, opium, aconite, veratria, conium, and physostigma.

7. *The tracts of the efferent impulses from the respiratory centre*, the *spinal centres* of the respiratory muscles, and the *nervo-muscular apparatus* of the chest and larynx, may be *stimulated*, not only reflexly, but directly, by strychnia, which greatly increases the vigour of the spinal centres; by electricity applied to the nerve trunks (phrenics, intercostals), or to the muscles directly; and by all measures which improve the nutrition of the nervo-muscular tissues, such as well-ordered exercise. Conversely, these parts may be *depressed* by physostigma, which greatly diminishes the vigour of the spinal centres: by conium, which paralyses the motor nerves; and by opium, which depresses the whole efferent mechanism. The use of these depressing measures is almost confined to the muscles of the larynx. Most powerful of all is the method of arresting, or at least controlling, the movements of the chest by direct restraint, which is best accomplished by means of strapping or bandaging.

When we review the various measures classed under the 4th, 5th, 6th, and 7th preceding heads, we are enabled to rearrange several of the most important of them into new groups with definite pharmaco-dynamical properties and important therapeutical bearings. These groups are—(A) *Expectorants;* (B) *Antispasmodics;* and (C) *Pulmonary Sedatives.*

A. *Expectorants.*—Expectoration, the discharge of the sputum, or secretions and other products of the respiratory passages, will manifestly vary with the *amount* and *characters* of the sputa, and with the expulsive *force* which can be brought to bear upon them. Measures are therefore called *expectorants* which increase the absolute amount of sputum formed, which so modify its characters as to facilitate its expulsion, or which evacuate it with greater ease: the first and second kinds of expectorants acting upon the glands, the third kind upon the muscular structures. Regarded otherwise, the expectorants will be found sometimes to stimulate the respiratory centre, *e.g.* ammonia and ipecacuanha, sometimes to depress it, *e.g.* warm, moist air. But of greatest practical importance is the action of expectorants upon the local circulation; and according to their stimulating or depressing influence in this respect they are commonly divided into (1) *Stimulant expectorants*, and (2) *Sedative expectorants.* It must be clearly understood that "sedative" and "stimulant" in this connection refer *not* to the respiratory, but to the circulatory effect of the bronchial measures.

(*a*). *Stimulant expectorants* include ammonia, scilla, all the essential aromatic oils, oleo-resins, and balsams enumerated above; strychnia, alcohol, warm liquid food, and moderate exercise of the body generally or of the chest.

(*b*). *Sedative expectorants* include alkalies, iodides, antimony; ipecacuanha, senega, and tobacco; warm, moist air; and warm, moist applications to the chest-walls.

If we wished to construct other groups of expectorants we might add:—

(*c*). *Expectorants with a sedative effect on nerves.*—These are chiefly obtained from combinations of drugs, *e.g.* scilla and opium, camphor and opium, ammonia and opium, even ipecacuanha and opium, antimony and opium, &c. Warm drinks have the same effect.

(*d*). *Expectorants which alter the chemical composition of the sputa.*—This is a highly important group. Alkalies increase the alkalinity of sputa. Sulphur, iodine, all the aromatic oils, oleo-resins, and balsams are excreted, as such, or as their products, along with an increased flow of mucus; and most of these, especially the aromatic substances, have an antiseptic, deodorant, and disinfectant effect on the secretion, and on the surface from which they are given off. The water of the bronchial mucus is increased in almost every instance of increased secretion, but specially by alkalies, iodine, and antimony, which thus possess the valuable property of increasing the liquidity of the sputa, whilst acids tend to diminish the amount of water, and thus the total amount of sputum, *i.e.* to "dry up" the secretion.

(B.) *Antispasmodics.*—These comprise a great variety of measures which have the common effect, directly or indirectly, of relaxing the muscular coat of the bronchi. They are :—(*a*) the various depressants of the respiratory branches of the vagus mentioned above (4 *a*), such as heat, iodides, alkalies, &c. (*β*) The depressants of the other afferent nerves to the respiratory centre (5), especially warm applications to the chest-walls. (*γ*) The depressants of the respiratory centre itself (6), alcohol, ether, chloroform, opium, &c. (*δ*) The direct nervo-muscular depressants—bronchial (4 *d*), such as atropia, tobacco, amyl nitrite, &c. ; and parietal (7), conium, &c. All these substances are distinctly depressant or sedative ; but we have still another group of bronchial antispasmodics (*ε*), which are perhaps the most powerful of all, viz., some of the sedative expectorants, such as ipecacuanha, senega, and tobacco. This paradoxical effect is easily explained : these substances, after momentarily increasing the spasm, cause a rapid and profuse flow of mucus from the bronchial wall, relieve the fulness of the vessels, provoke cough, and induce expulsion of the cause of the spasm.

(C.) *Pulmonary sedatives.*—These measures deserve a special name. The depressants of the afferent branches of the vagus to the brain, such as opium, ether, chloroform, &c., act as antispasmodics and muscular depressants, *i.e.* prevent bronchial spasm, widen the tubes, arrest cough, and prevent or relieve pain and other distressing sensations referred to the respiratory organs. The most rational kind of pulmonary sedatives, however, are the expectorants above enumerated, when the cause of the distress can be removed. A combination of the two classes will manifestly answer best in most instances.

(*To be continued.*)

# Reviews.

*Enteric Fever: its Prevalence and Modifications: Ætiology, Pathology, and Treatment, as Illustrated by Army Data at Home and Abroad.* By FRANCIS H. WELCH, F.R.C.S., Surgeon-Major, A.M.D.

IN the observation of a disease like enteric fever, which is most commonly believed to be specific, whatever may be the hypothesis adopted as to the difficult question of the origin of species in disease, there is nothing more necessary than a wide view of the extent of its prevalence and of the forms of its varieties for gaining light on the conditions of its existence and its essential qualities as a species. Hardly any better opportunity for wide observation under different surroundings can be offered than to a medical officer in the English army, which is scattered from Canada to China, from Scotland to the Cape. Surgeon-Major Welch, in this modified reprint of the Alexander Prize Essay of 1881, has made a very unassuming but careful attempt to comprehend this wide survey, and has furnished us with much practical experience and some interesting facts from blue-books issued throughout the last twenty years. It may not be necessary to the busy English practitioner to realise what enteric fever is like in India or the Mediterranean, but it is essential to any serious attempt to understand its nature, and must be one preliminary at least of its suppression.

Mr. Welch has only to treat of one class of English subjects, viz. the English soldier, and so may assume that the material on which external causes work being, on the whole, similar throughout, variations in the disease are to be ascribed to the surroundings.

The soldier in England, so far at least as we have sufficiently large numbers from which to judge prudently, gets less enteric fever and recovers better than anywhere else; though he does not get so little or recover quite so well as the average of the civil population, probably because he furnishes the young and vigorous class of subjects which enteric fever selects. In India he gets it three times more often, and the percentage of deaths is nearly twice as great. In Gibraltar and Malta he gets it five times as often, but it is not much more fatal than in England. These are serious facts for a small army that has an annual average of 60,000 men in India and 10,000 in the Mediterranean. In India the chances of other diseases are so many that enteric fever is hardly looked upon as more important than at home. In Gibraltar and Malta it becomes, along with its close allies of "rock fever," Maltese fever, and much unclassified simple continued fever, one of the most dreaded of diseases. Mr. Welch describes some differences in the types assumed: in India it is a disease of lower temperature than in England (as also is the case with small-pox, scarlet fever, and measles); it is apt to have its highest daily temperature not later than noon, or 1 P.M.; whereas in England, so far as has been at present ascertained, its average daily culmination is about 6 P.M. In Gibraltar and Malta it is more septicæmic in character with some consequent joint affections; those long-inhabited and crowded spots being saturated with accumulations of sewage never thoroughly washed off by rain. The disease, too, in India is apt to have some combination of the symptoms of ague, as it sometimes re-awakens previous paroxysmal malarial fever; but it is interesting to note that from a careful examination Mr. Welch concludes that the paroxysmal and continued types of fever neither vary together nor are mutually interchangeable; and further, that the frequency of enteric fever does not vary along with that of other diseases of the intestinal canal, but stands by itself; both conclusions tending to confirm its specific character. A long review of the causes of the various outbreaks during the last twenty years at the chief stations of the English army tends also to the same result.

With regard to treatment Mr. Welch chiefly confines himself to Indian experience. Quinine, in doses of about fifteen grains a day, is taken as a sheet anchor, being chiefly valued as a corrective of the systemic depression so much more universal in India; digitalis is held one of the best of tonics. "I know of nothing," says Mr. Welch, "so purely sedative on these viscera (liver and stomach) as one or two large doses of calomel, grains vi-viii;" but this only applies to the first week or ten days, afterwards much bismuth is recommended, or opium, if necessary, alcohol in small quantities, and occasionally cold baths.

The whole subject is interesting, and the treatment throughout most painstaking; Mr. Welch is not trying to make his facts fit a preconceived theory. He has the great candour to admit, with regard to three divisions of the Indian army (p. 35), that "each of the three segments has returned in certain years more deaths than admissions," a fact which we may trust can affect only "a quotum," as he phrases it, of his results.

*The Systematic Treatment of Nerve Prostration and Hysteria.* By W. S. Playfair, M.D., F.R.C.P., Professor of Obstetric Medicine in King's College. 8vo, pp. 92. London: Smith, Elder & Co. 1883.

There has been a tendency during late years to indulge in more observation and analysis of curious mental and bodily states connected with hysteria than is quite consistent with a steady attention to means for curing it. Hysterical paralysis and anaesthesia may be interesting while they last, but it should be the doctor's highest interest to find out how to put an end to them. Dr. Playfair has done good service in republishing the very vigorous remarks he made at the Worcester meeting of the British Medical Association in 1882 and elsewhere on the means of curing hysterical cases of extreme prostration that seemed almost hopeless. He writes with the energy of fresh conviction, and the unqualified confidence inspired by first successes. He has found it possible to restore to a completely healthy and active enjoyment of life ladies who for many years have been bedridden invalids, reduced to skeletons by refusal of food, and, indeed, only over-persuaded, as it would seem, by sedulous friends to keep themselves alive. The essential points in his treatment, for which Dr. Playfair fully acknowledges his debt to Dr. Weir Mitchell, are: "(1) The removal of the patient from unhealthy home influences, and placing her at absolute rest; (2) The production of muscular waste and the consequent possibility of assimilating food by what have been called 'mechanical tonics,' viz. prolonged movement and massage of the muscles by a trained shampooer and muscular contractions produced by electricity; (3) Supplying the waste so produced by regular and excessive feeding, so that the whole system, and the nervous system in particular, shall be nourished in spite of the patient."

The weight of practical responsibility attaching to a diagnosis of purely functional disease becomes very grave if such treatment is to follow; the compliment paid to the doctor by submission to his judgment is very high. The patient is taken away entirely from her friends, committed to a nurse and *masseuse*, and along with the "passive exercise" the amount of food is increased and no refusal of it is allowed, until a total is reached which any athlete might envy; leading, as in a case described by Dr. Playfair, to daily increasing pleasure in its repetition, and to a gain of three stones weight in six weeks, and a rapid recovery from twenty years of invalid life.

There is another class of feeble helpless hysterical patients whose malnutrition has led to their being not thin but fat, and even these Dr. Playfair will not allow to escape the toils of his system. They are first to be treated on starvation diet, reduced gradually to "a quart a day, or even less, of skimmed milk" (p. 91), until in two or three weeks they have lost fourteen to sixteen pounds of the "unwholesome fat"; then the method of attack is to be shifted, and abundant food to be poured in and abundant massage to be used as its digestive. To such ideals of the trainer's art Dr. Playfair reports himself to have attained: he is not unaware of the initial difficulties, or of the great importance of good administration; "for if, after a sufficient time, the patient is not able to take and assimilate the large amount of food given to her, most certainly the *masseuse* is at fault" (p. 2). Unhesitating confidence and uncompromising optimism have often been shown to be of the highest value in the difficult treatment of hysteria; and Dr. Playfair certainly deserves our thanks for guiding these into a rational course; the tact and judgment also required are unfortunately harder to teach.

# Clinic of the Month.

**Perchloride of Iron in Skin Diseases.**—Dr. Casarini, in the *Spallanzani*, states that the external employment of perchloride of iron is highly useful in many chronic diseases of the skin, employed as an ointment consisting of one, two, or three parts to thirty of lard, or as a lotion mixed with two or three parts of water. The diseases in which it is most efficacious are subacute and chronic psoriasis, eczematous lichen, and eczema—after all acute symptoms have subsided. From the cases he has employed it in he draws these conclusions:—(1) The perchloride is a highly efficacious remedy in the treatment of simple and hæmorrhagic purpura. (2) It is very useful in the chloro-anæmic condition which often accompanies certain skin diseases, such as rupia, ecthyma, and impetigo. (3) It is employed externally with promptly efficacious results for ulcers dependent on scrofula and constitutional syphilis. (4) Used as an ointment it modifies in a most efficacious manner the squamous skin diseases, and especially psoriasis. (*Presse Méd. Belge*, July 29, 1883.)

**Pathognomonic Sign of Fracture of the Neck of the Femur.**—Prof. Bezzi, after showing, in the *Spallanzani*, the difficulties and uncertainties which often attend the diagnosis of this accident, observes that at the Milan Hospital a traditional practice exists of exploring, whenever fracture of the neck of the femur is suspected, the short space between the trochanter and the crest of the ilium. In place of the considerable resistance which is there produced in the sound limb through the tension of the tensor fasciæ latæ there is found, when the injury has occurred, a deep depression, due evidently to the diminution in the tension of this muscle, owing to the approximation of its points of attachment. (*Presse Méd. Belge*, July 29, 1883.)

**Clinical Characteristics of Wool-sorters' Disease.**—The following memorandum has recently been prepared for use in the inquiry now being conducted by Mr. Spear into the occurrence of anthrax amongst men employed in hide warehouses, tanneries, etc.:—

*The "Internal form" of Anthrax fever.*—Premonitory symptoms (of variable duration): Chilliness, aching or stiffness of limbs, and mental depression; restlessness, sense of constriction of chest, and oppression of breathing; headache, dizziness, nausea, or, less frequently, vomiting. Stage of full development—Notwithstanding the indefinite premonitory symptoms, the stage of full development is generally somewhat sudden and unexpected in its onset, so as to cause much alarm. The prostration and restlessness become extreme; there are præcordial anxiety and dyspnœa; blueness of the face and extremities (cyanosis) is conspicuous; and the patient may die within twenty-four or thirty-six hours with all the appearances of collapse or of asphyxia. A fatal termination is, however, more often postponed until from two to five days after the commencement of this stage. Other nervous phenomena—muscular paralyses, convulsions, or tetanic spasms—are then likely to develop themselves; and evidences of various acute local congestions (especially of the lungs, less frequently of the gastro-intestinal tract) are rarely wanting. Delirium is often absent; and the temperature is irregular. Exacerbations, alternating with more or less complete remissions of the more urgent symptoms, constitute usually a striking feature of the disease. Recovery is not so rare as has been supposed, even in fully developed attacks; but death may occur from a relapse, or from secondary septic processes. The body after death usually undergoes rapid decomposition, with blue discoloration and swelling, especially about the neck.

[Before the disease was identified amongst the wool-sorters, deaths were usually referred to one of the more prominent local symptoms of anthrax, and were registered as from "pneumonia," "enteritis," "peritonitis," "meningitis."]

*The "External form" of the infection, or Malignant Pustule.*—The malignant pustule attacks almost always parts of the body habitually uncovered, and most frequently the face. It commences as a small papule, which quickly develops into a vesicle, and this, being broken, pours out a little watery exudation. The base of the vesicle, and the surface immediately adjacent, dies; so that in about three days after its appearance the lesion consists of a small central black eschar, with a raised border of inflamed and tumid skin upon which vesicles are likely to be developed; a crop of secondary vesicles surrounding thus the central eschar like a wreath. The neighbouring lymphatics and glands are speedily implicated; and the patient may soon lapse into the condition, described above, of constitutional infection. The pustule does not apparently always present this typical appearance; when occurring upon the hands such appearance is uncommon. It has then no central black eschar, no raised vesiculated border. It is described as "a small, slightly inflamed tumour, exuding only serosity; giving rise to comparatively little pain or even increased sensibility, but showing a tendency to set up a diffuse cellulitis." Constitutional infection may follow.

**Kairin.**—An excellent series of clinical observations on the anti-febrile action of kairin has been contributed to the *Berliner klin. Woch.*, No. 31, 1883, by Paul Guttmann. The number of experiments made upon forty-two patients was seventy-two. These included cases of pneumonia, measles, phthisis, typhoid fever, scarlatina, pleurisy, peritonitis, erysipelas, ague, and septicæmia. It is understood that the experiments were only made when the fever in the above diseases was present and likely to remain so. This principle was carried out as far as possible, and the drug was administered in the latter part of the morning, and continued till the end of the afternoon. In the majority of cases the temperature ranged from 39°·5 to 40°·5 Cent. when the experiment was commenced. It was shown that kairin, administered in hourly doses of one-half to one gramme, was soon followed by a gradual fall in the temperature of the body: so that in from three to four and a half hours after commencement, in the majority of cases, a considerable reduction had taken place, and in several the thermometer indicated a normal body heat. By repeated doses of a gramme of the kairin the normal temperature may always be gained—this is vouched for by Filehne and Guttmann. The course of the downward curve is sketched. In many patients a notable degree of perspiration was met with—especially in cases of phthisis. As the temperature falls the pulse becomes less frequent. No unpleasant symptoms were caused by the kairin, which was used freshly prepared; older specimens may give rise to cyanosis and collapse. The antipyretic effect of kairin is not weakened through repeated use; each new dose is followed by the usual result. Kairin is incapable of shortening the disease or altering its phenomena. Greenish coloration of the urine appears about twelve hours after the administration of the drug, and lasts generally for about twenty-four hours. A contrast is made between the effects of quinine and those of kairin. The latter acts more rapidly, but is of shorter duration; the former is just the opposite. Kairin given in hourly doses of one gramme, after the employment of three to four grammes, has a more powerful and constant anti-febrile effect than quinine in doses of one and a half to two grammes. Owing to the high price of the new remedy, it is probable that its extensive introduction must be postponed. (*Med. Times.*)

**Molluscum Contagiosum Giganteum.**—Under this name Dr. S. Laache, of the Anatomico-Pathological Institute of Christiania, describes, in a recent number of the *Nordiskt Mediciniskt Arkiv,* a tumour extirpated from the nape of the neck of a female aged fifty-six. This tumour, which had lasted for thirty years, but had increased considerably for the last four years, was of the size of the fist, with nodulations or unequal protuberances on the surface; it was covered at its base with normal skin, sending tongue-like ramifications over the whole tumour, and which were transformed at last into a delicate membrane, half pellicular and half granular, covering the whole mass except at the summit, where there was a flat crateriform depression. Under this incomplete covering there was the mass of the tumour, which, as it were, undulated beneath the surface. The cut surface, also composed of nuclei of unequal size, separated by septa of cellular tissue, presented a granular aspect, but the knife was not covered with adipose matters. Examined by the microscope, the lobules contained, in the circumference, cells evidently resembling epidermis, while in the centre were seen a considerable quantity of corpuscles with an adipose or waxy lustre strongly resembling amyloid tissue. In all other respects they resembled the corpuscles of molluscum, with which the author compared them. In his remarks on the case, Dr. Laache discusses the differential diagnosis between molluscum and epithelioma or cancroid, to which last the tumour was at first referred. From cancroid, however, the molluscum in question was distinguished by its definite form and its tendency to grow outwards, moreover by its being covered entirely by a kind of delicate skin without any apparent ulceration. It was, however, the presence in considerable quantity of corpuscles of molluscum which determined the diagnosis. The author admits, however, that, as regards prognosis, the tumour could not be regarded as being so benignant as ordinary molluscum, and he therefore thinks he ought to consider it as a transitional form between the malignant epithelial tumour and the benignant one. He observes that there was no relapse at the end of more than six months. In conclusion, Dr. Laache considers the presence of nuclei in several of the shining corpuscles as a proof in favour of the opinion that the corpuscles of molluscum are the results of a peculiar degeneration of pre-existent epidermal cells. (*Med. Times and Gaz.* Aug. 11, 1883.)

**Significance of the Immobility of One Vocal Cord.**—Dr. J. Solis Cohen in a recent paper points out: First, that laryngoscopy may sometimes be the sole or most efficient means of diagnosis in affections located exterior to the larynx; and second, that a liability to error might often be incurred, were we to place too exclusive a reliance upon the objective symptoms, as presented by the image seen in the laryngoscopic mirror. From a study of cases under his observation he concludes: (1) That whenever the left vocal band is immobile in abduction, or in the cadaveric position (positions in which the patency of the glottis is not interfered with), and there is cough or dyspnœa (or both), without cardiac or pulmonary lesion to account for these symptoms, we are justified in suspecting aneurism of the aortic arch; and difficult deglutition will be almost certainly confirmatory of the diagnosis, notwithstanding the absence of tumour, pulsation, thrill, and bruit. The only, and exceedingly improbable source of error would be intrathoracic neoplasm. (2) That ankylosis of the cricoarytenoid articulation may fairly be suspected in cases of immobility of one vocal band, not referable to mechanical interference with the transmission of nervous influence; unaccompanied with evidence of central or local nervous disease; and in which failure to respond to appropriate treatment will warrant us in excluding muscular atrophy. But the diagnosis can be finally established only by the application of direct pressure to the affected arytenoid cartilage. (3) That whenever one vocal band is immobile in the cadaveric position or in abduction, and there are no other signs or symptoms to assist the diagnosis, ankylosis being eliminated, we should not be satisfied with a diagnosis of neuropathic paralysis; but should keep the patient under observation with a view to detecting the earliest manifestation of aneurism, consolidated lung, or other mechanical cause for the impaired innervation. (*American Journal of the Medical Sciences*, July 1883.)

**Treatment of Exophthalmic Goître.**—From an experience of upward of seventy cases, and fortified by the unanimous observations of Von Dusch, Eulenburg, Meyer, Erb, and others, Dr. Chvostek is led to regard the rational employment of galvanism as the most important part of the treatment of Basedow's disease. He recommends the following method to be pursued: (1) the ascending constant current applied to the cervical sympathetic, on each side, for at the most one minute; (2) the same to the spinal cord (the anode at about the fifth dorsal spine, the cathode high up in the cervical region); (3) through the occiput (one pole at each mastoid process), and in certain cases also through the temples, a constant current, for at the longest one minute, and so weak that the patient can feel but the slightest sensation of burning. Sometimes also local galvanisation of the thyroid gland with a weak constant current for about four minutes, the current to be reversed at the end of each minute. The applications should be made every day if possible. As a rule very good results were obtained, even in the most severe cases a cure or marked improvement being recorded. In three cases death resulted from excessive anæmia or complications. (*Centralbl. für klin. Med.* June 23, 1883.)

**Hydrobromic Acid in Nervous Affections.**—Dr. C. L. Dana states that in epilepsy the substance cannot be used as a substitute for the bromides except in the more controllable cases in which one wishes to keep up a mild sedative effect for a long time. Dr. Dana did not find that hydrobromic acid when given with quinine prevented cinchonism. The best results which he got from the use of the drug were in conditions of nervous irritability, congestive headaches, post-hemiplegic circulatory disturbances, irritable heart, stomachal vertigo, and in insomnia. Dr. Dana has not found that hydrobromic acid produces any sign of bromism beyond some drowsiness. When very large doses have to be given inconvenience arises from the large amount of acid administered. In order to bring about a sedative action the writer uses a drachm and a half to two drachms and a half of a 10 per cent. solution. (*American Journal of Nervous and Mental Diseases,* July 1883.)

**Artificial Inflation of the Large Intestine.**—Professor von Ziemmsen strongly recommends inflation of the large intestine by carbonic acid for several important purposes. The method is very simple. A rectal tube about six inches long is introduced into the anus and fixed by pressing the nates together, the patient being in a supine position. This tube is connected with a funnel by means of a simple india-rubber tube. A solution of about five drachms of bicarbonate of sodium and about half an ounce of tartaric acid are dissolved in water, and the solution of bicarbonate of sodium, or a part of it, is then poured into the intestine, and after it a solution of tartaric acid. Carbonic acid is thus evolved in the intestine, and the whole of the large intestine becomes distended. If the whole of the solutions are poured in at once, the evolution of gas is so sudden as to cause great pain, and it is therefore better to introduce them at three or four times with intervals of several minutes between. In order to prevent the carbonic acid from being developed in the tube itself, it is best to wash the sodium salt into the intestine with a little pure water before introducing the acid. This method is of great service in diagnosis, enabling us to form a definite opinion regarding the position, form, and dilatability of the small intestine, the more or less complete action of the ileo-cæcal valve, communication of the colon or rectum with neighbouring parts such as the stomach, small intestine, and bladder, or with the surface of the body. Regarding also the position of contractions or obstructions in the intestine, and sometimes also regarding the nature of an impediment to the passage of the fæces, one most important use of this method is to diagnose the position of stricture or obstruction of the intestine in cases where it is desirable to operate. It also shows the position of peritoneal adhesions. Usually the ileo-cæcal valve closes the small intestine completely, but under deep chloroform narcosis its resistance is lessened. As a therapeutic method, distension by carbonic acid may be used simply to evacuate the bowels, and when this is the case three drachms of bicarbonate of sodium will be sufficient. It may also be used in order to remove alterations in position, bends, or twists in the colon, in place of the large enemata which have been recommended for this purpose. Where a twist or obstruction is suspected in the small intestine, a distension under chloroform narcosis may be tried. This method is therapeutically contra-indicated by affections where the resistent power of the intestinal tube is diminished, but practically this contra-indication only exists in typhoid fever and tuberculosis of the intestine. In other cases of ulceration and malignant disease the author has never seen any injury. After diffuse or circumscribed peritonitis, and especially after perimetritis and perityphlitis, the method is theoretically contra-indicated on account of the tearing of adhesions, but in practice this is on the contrary rather advantageous. The tearing of adhesions by the distension of the intestine with gas often causes intense pain, but produces no inflammation: consequently, repeated dilatation with carbonic acid is useful in removing the after-effects of perityphlitis, pericolitis, and periproctitis. (*Deut. Arch. für klin. Med.* p. 235, vol. xxxiii.)

**Insanity from Measles.**—Dr. Madigan records three cases of insanity occurring either during the course of or in convalescence from measles. The youngest of those affected was sixteen, and the oldest twenty-six years of age. The same author in the *Journal of Nervous and Mental Diseases*, 1883, also comments on instances showing a marked relation between insanity and diabetes, the relation being mainly one of alternation. (*American Journal of Neurology and Psychiatry*, 1883.)

**Desquamation of the Intestinal Epithelium.**—In his lectures on general pathology Cohnheim considers the separation of the epithelium from the intestine in cholera to be entirely a post-mortem phenomenon. Virchow (*Archiv*, Dec. 1882) protests strongly against this view, and insists that exfoliation of the epithelium of the small intestine not only occurs during life, but that sometimes during life the exfoliated epithelium is evacuated. This occurs not only in cholera but in spotted fever, and sometimes in typhoid. In reference to these observations of Virchow, Boehm notes that a similar desquamation of the epithelium may be produced during life by the administration of poisons. It occurs in acute arsenical poisoning, and in poisoning by substances of the muscarin group. The animals in which this phenomenon is best observed are cats, which, after injection of muscarin or similar substances, exhibit choleraic symptoms, vomiting and purging, the motions being at first fæcal, and afterwards white and slimy: the slimy masses consist partly of isolated epithelial cells and partly of epithelial tubes like the fingers of a glove. In arsenical poisoning the epithelium undergoes peculiar alterations within the intestine: the body of the cell swells up to a hyaline ball, the margin splitting into the form of small cilia, cells thus altered looking very like flagellate monads, from which they are distinguished, however, by the absence of motion, and by the fact that all the intermediate forms, from an unaltered intestinal epithelial cell to a ciliated ball, can be seen together in a single field. (*Virchow's Archiv*, vol. 93, June 1883.)

**Fat in the Stools in Pancreatic Disease.**—In the *Deutsche medizinische Wochenschrift* (September 12th) Dr. Ziehl records a case of cancer of the pancreas occurring in Professor Erb's clinic at Heidelberg, and discusses the question of fatty stools in pancreatic disease. The case itself presented no unusual features, but the predominance of gastric symptoms suggested the stomach as the seat of the disease, which was marked by the appearance of a painful tumour in the left side of the epigastrium, and by jaundice. The motions were of a peculiar silvery grey colour, and found microscopically to consist in great part of masses of acicular crystals soluble in ether; chemical analysis showing the stools to be composed of fat to the extent of half the solids. On dissection there was found a large scirrhous cancer of the pancreas, which had invaded the walls of the stomach and duodenum, and occluded the common bile-duct. The pancreatic duct was dilated and distended except at its termination, which was lost in the cancerous mass. The writer, after saying that the case illustrates the well-known fact of pancreatic disease being marked by the occurrence of fat in the stools, shows that the form in which the fat occurred in this case was exceptional, almost requiring the microscope for its detection, whereas it usually occurs in amorphous masses recognisable at once, and not in crystalline form. He further shows, by reference to cases recorded by Friedreich, Nothnagel, and Gerhardt, that when fatty crystals in excess are present there is not only pancreatic disease, but also occlusion of the bile-duct, the last-named author finding crystals resembling tyrosin and leucin in a case of catarrhal icterus. Some doubt may be expressed whether the crystals in question were tyrosin rather than fatty crystals; but Gerhardt's suggestion, that in such a case there was also temporary plugging of the pancreatic duct, is probably true. Indeed, if the accepted view of catarrhal jaundice be a fact, there must surely be as much hindrance to the escape of the pancreatic juice as of the bile. If it were more frequently the custom to submit the alvine evacuations to as minute a scrutiny as is brought to bear on the urinary excretion, the occurrence of fatty matter in excess in the stools would doubtless be found in many more cases than those of primary disease of the pancreas. (*Lancet*, Sept. 22, 1883.)

**Uterine Hæmorrhage after the Menopause.**—During the course of a late clinical lecture on malignant disease of the cervix uteri, Dr. T. Galliard Thomas stated, as an axiom in gynæcology, that if a woman who has normally ceased to menstruate begins to have uterine hæmorrhage, we should always suspect cancer. "Not infrequently you will see in the medical journals the reports of cases where women who have passed the change of life have begun to menstruate regularly again; but such accounts are altogether deceptive, and, if these cases could be followed out, it would be found, with scarcely a single exception, that the uterine flow was merely the indication of the presence of malignant disease. In other words, there is absolutely no such thing as a return of the menses when a woman has once reached the normal menopause. Not long since a patient of mine in the Woman's Hospital, who is sixty years of age, began to have a flowing from the uterus, and, as there was no indication of any external disease, I applied the curette to the endometrium and drew out some pulpy masses, which I sent to a well-known microscopist for examination. The report that I got from him was that the growth was not malignant in any respect, but was simply a form of polypus. I am perfectly sure, however, that the microscopist is wrong, and for this reason: in the uterus of a woman of sixty polypi never develop. The organ at that age is completely atrophied. Sometimes in women who have passed the menopause you will find uterine tumours which have all the appearance of fibroids. They are not by any means fibroids, however, but sarcomata." (*New York Med. Journal*, Sept. 1, 1883.)

# Extracts from British and Foreign Journals.

**Renal Changes in Hæmoglobinuria.**—Dr. Lebedeff has made observations on the alterations which the kidney undergoes in the hæmoglobinuria induced by various poisons such as chlorate of sodium, iodine, and glycerine. In all cases the general result was the same whatever the poison employed: the alterations differed from one another only in intensity. There was always an excretion more or less well-marked of a coagulable albuminous substance into those parts of the kidney which are regarded as peculiarly secretory, namely, in the convoluted tubules and their terminations where the columnar epithelium is present, and to a less extent in Bowman's capsule. The epithelial cells were invariably concerned in this excretion, for the alterations which occur in them cannot be otherwise explained. These alterations consisted in swelling of the cells by imbibition of fluid, and in the formation of numerous round vacuoles. The vacuoles are formed throughout the whole cell and not in the homogeneous substance only. The hyaline albuminous substance makes its exit from the cells into the lumen of the tubules and appears to do this in different ways: sometimes it would seem as if the part of the cell directed towards the lumen of the tubule became separated and only the peripheral part remained behind. The nucleus may remain in the latter part but sometimes it appears also to pass into the lumen of the tubule. This destruction of the cells appears only to occur in severe cases. In other cases the albuminous substance appears to be excreted through the margin of the cell into the tubule, while the cell itself remains intact. The greatest part of the albuminous substance appears to be secreted by the cells, but sometimes undoubtedly exudation occurs in the capsule and indeed always occurs in severe cases. The amount of exudation in the capsule however is not in proportion to the enormous amount in the tubules, especially in those cases where death occurs at the time when the albuminuria is most intense. It must therefore be assumed that the albuminous substance from the glomeruli becomes mixed with the coagulable secretion of the cells, and from the mixture the homogeneous cylindrical masses are formed which are especially found in the non-secretory parts of the tubules. This mode of production of hyaline casts has been already observed by Cornil in various processes, but in the present instance the substance is not the same as that which forms the hyaline casts in nephritis, for here there is a greater or less admixture of hæmoglobin. The plasma containing hæmoglobin is secreted from the loops of the glomeruli, but a large portion of the albuminous substance composing the cast originates from the cells of the convoluted tubules. It is only during its passage through the canals of the kidneys that a precipitate or coagulation of the colouring matter of the blood takes place, probably in connexion with re-absorption of fluid. The changes in the cells of the convoluted tubules are not purely passive, but the cells play an essential part in the secretion of albuminous substances and hæmoglobin, by the long continuance of which however they become damaged themselves. These changes in hæmoglobinuria are essentially the same as those observed in profuse excretion of albumen in general and especially in acute nephritis and in amyloid degeneration. Whether it is allowable to speak of true nephritis in hæmoglobinuria must be settled by the further course of the morbid changes. The alterations in the epithelium and the formation of casts alone does not warrant it. (*Virchow's Archiv*, vol. 92, Feb. 1883.)

**Syphilis in Animals.**—Professor Neumann a while ago spoke on this point before the Medical Society of Vienna. The conclusion at which he arrived was that syphilis was *in toto* a disease of the genus *homo*. The animals experimented on by him were three apes, two horses, a hare, a rabbit, a guinea-pig, a marten, a rat, and a cat. Inoculations on these animals were made in one or more places, and in some cases at different times, with the discharge of indurated syphilitic sores or of syphilitic papules, or the hard sore itself was cut out and straightway inserted in the subcutaneous tissue of an animal. Some experiments were also made with the pus from a soft chancre. Every precaution necessary to prevent putrefaction and ulceration was carried out by the use of clean instruments and by the performance of immediate inoculation from the patient to the animal. The time during which the animals continued under observation varied considerably, but the exact duration is not mentioned in all cases. It is sufficient to say that, notwithstanding an energetic system of inoculation, no other local signs than those of an apparently ordinary inflammation were produced, and in many instances no result whatever occurred. A lively discussion ensued, in the course of which Dr. Auspitz said that he had injected some pus taken from a true Hunterian sore into the crural vein of a dog; an induration developed at the site of inoculation, but no further symptoms appeared, and the primary sore healed. It would appear that soft sores are communicable to animals. Dr. Mracek mentioned an experiment performed by Hänsell, in which the anterior chamber of the eye of a rabbit was inoculated with some material from a broken-down gumma. At the autopsy the lungs and liver as well as the iris and ciliary body were studded with small hard knots; at the point of infection a fatty abscess had arisen, which, however, had not completely destroyed the cornea. Neumann remarked that these phenomena had not, in his opinion, the appearance of the products of syphilitic disease. The exanthem described by Klebs in a monkey was probably of a hæmorrhagic nature, and Neumann had been unable to obtain a positive result in experiments conducted in a similar manner to those of Klebs. Professor Müller, of the Veterinary College, had seen dogs affected with condylomatous growths on the penis, which sometimes were transmitted by copulation. A disease resembling syphilis had been described in hares. The alleged venereal disease of pigeons is really a tuberculous affection of the joints. In horses a "chancre" epidemic is not unfrequently observed—minute vesicles form and burst, on the penis and prepuce; sometimes abscesses form in the testes, accompanied by much debility, and the formation of gummata. Professor Kaposi, we think, expressed the true state of our knowledge on the subject when he said that we had, as yet, no proof of the transmission of syphilis to animals. (*Wiener med. Woch.*, No. 2, 1883; *Med. Times.*)

**Alkaloids in Human Saliva.**—In the *Gazette hebdomadaire*, No. 29, 1881, there is a notice of A. Gautier's discovery that in the normal human saliva there is present an alkaloidal non-albuminous substance which is said to possess the following properties: It is soluble, is not precipitated by boiling, does not decompose at 100° C., and yields crystalline chlorides with gold and platinum. Its physiological action is somewhat similar to that of the ptomaines. When introduced into the organism it has an action like snake-poison, and acts most powerfully on birds. Odo Bugwid has made a number of experiments on saliva, and finds that in the extract obtained from 1000 ccm. of normal saliva there is not sufficient poison to kill or even do much injury to small animals. (*Virchow's Archiv*, vol. 92, Jan. 1883.)

**Etiology of Suppuration.**—It has been said by some that suppuration only occurs in the presence of microzymes; others, again, hold that it may occur in their absence. In order to decide this question, Dr. Councilman has made some experiments in Professor Cohnheim's laboratory. The result of these experiments, in which he thinks that the entrance of micro-organisms from without has been certainly excluded, is that their presence is not necessary to produce purulent inflammation, for that certain chemical bodies, for example croton-oil, can do this. (*Virchow's Archiv*, vol. 92, May 1883.)

**On Lead Poisoning.**—Harnack came to the conclusion from his experiments that lead was a muscular poison, causing a peculiar loss of irritability of the muscular substance, so that when a muscle was subjected to the action of stimuli at regular intervals, it responded by very unequal contractions which were sometimes large, sometimes small, and sometimes entirely absent, although the stimulus was of equal strength in each case. A number of experiments have been made by Von Wyss on this subject, and he finds that lead tri-ethyl causes in frogs restlessness, quivering of the whole body, and loss of spontaneous movement, followed by loss of reflex action. The result was exactly the same as that obtained by Harnack, but the author thinks that it is simply that of complete paralysis of the central nervous system. At this time the muscles of the body were readily irritable, and continued to be so for several hours. After twenty-four hours, when the animal was entirely dead, the muscles presented a peculiar whitish discoloration and stiffness. This appeared earliest, and was most intense in the neighbourhood of the injection, and presented the greatest similarity to a weak caustic action, while the general action on frogs was exactly that observed by Harnack; the author could not find any marked evidence of muscular paralysis. The muscles become paralysed at a very late period after poisoning, and no difference could be detected between the irritability of a poisoned muscle and one from which the poison had been excluded by ligature of the afferent artery. These experiments, therefore, appear to show that lead has no special affinity for the muscles, and is not to be regarded as a muscular poison. On the other hand, the acetate of lead tri-ethyl is a powerful poison for frogs, and appears to paralyse the central nervous system. When lead is administered to frogs internally in increasing doses the animals die with epileptic convulsions. These facts appear to indicate that lead has a tendency to affect the central nervous system rather than the muscles, and that the cause of lead-poisoning is to be sought in an affection of the nervous system rather than of the muscles. (*Virchow's Archiv*, vol. 92, May 1883.)

**The Action of Saline Cathartics.**—Dr. Matthew Hay concludes the report of his investigation into the action of saline cathartics as follows:—"They all tolerably closely agree in the ultimate effect they have on the alimentary canal and the body generally. They cause no irritation or inflammation of the canal; stimulate but in the smallest degree the secretion of the more important digestive juices, as the gastric, the pancreatic, and the biliary; have, under ordinary circumstances, little action on the blood; and mainly act by increasing the intestinal secretion, and by hindering the absorption of the intestinal fluid. Their purgative action is therefore extremely simple. They sweep out the contents of the alimentary canal with the least possible disturbance of the digestive system and of the other systems of the organism. Few other purgatives, if any, have so simple an action. The value, therefore, which has long been assigned to them in the treatment of the occasional disturbances of digestion, to which almost every one is at times subject, and where the indication seems to be to empty the canal '*cito, tuto, et jucunde*,' is quite justified by the results of this investigation." (*Journal of Anatomy and Physiology*, July 1883.)

**Capillary Pulse.**—In normal physiological conditions the pulse waves become so toned down by the elastic property of the arterial walls that no pulse can be said to exist in the capillaries. Under certain circumstances the pulse wave is carried over to the capillary vessels and may there be demonstrated. Quincke published a paper on the subject in 1868 in the *Berliner klin. Wochenschrift*, No. 34. According to him, the capillary pulse, characterised by alternating pallor and redness of the tissues isochronous with the systole and diastole of the heart's action, is specially perceptible in the matrices beneath the nails. The phenomenon may be seen sometimes in the healthy body, in those suffering from anæmia, and especially in individuals the subjects of aortic regurgitation. Quincke further observed the capillary pulse in the capillaries of the fundus oculi of two patients under treatment for valvular insufficiency of the aorta. Writing in *La France Médicale*, No. 15, M. Albert Ruault has again drawn attention to the phenomenon. He recommends the production of a vasomotor disturbance by drawing the finger-nail smartly across the skin of the forehead and studying any variations which may present themselves. A sensitive area, so to speak, is thus produced where the capillary pulse may be seen in those in whom it happens to exist. Ruault has observed the condition in various pathological states where the coexistence of excessive cardiac impulse and general arterial narrowing was noted. (*Lancet*, August 18, 1883.)

**Attenuation of Chancrous Virus.**—We have already drawn attention to the hypothesis that the principle of attenuation may play an important part in the explanation of some of the remarkable changes which diseases undergo, either under the influence of intentionally administered agents, or from the action of quasi-accidental circumstances originating within or without the organism. The notion of destroying or annihilating a disease can only be entertained side by side with the belief that the chief factor of a disease is some tangible entity. Absolute extermination can only be aimed at whilst the microparasites exist in the environment. When once the organism is attacked we must trust to attenuation. Chemically the distinction between destruction and attenuation, however great, may be regarded as one of degree. In destruction we may say there is a passage from the organic to the inorganic; whilst in attenuation the transition may be to a body which is equally vital, organic, and complex with the original poison, but possessing different physiological properties. One of the latest practical phases which this new development of the principle of attenuation has received comes from the observations and recommendations of M. Aubert. The author concludes from his experimental and clinical researches that in the agency, heat, we possess an excellent means of attenuating the chancrous virus, and consequently of treating the simple chancre. He finds that a temperature a little above the normal body-heat, of 37° to 38° C., destroys the virulence of the poison. It is necessary to combine elevation of the internal body-heat with that of local warmth, and practically to imitate what goes on in the organism affected with erysipelas when there is general fever and local heat. M. Aubert advises the employment of the hip-bath, made with water at a temperature of 40° to 42° C., and continued for several hours. Chancrous ulcers may thus have their virulence destroyed. This mode of treatment is considered to be the best for phagedænic ulceration, and for those subphimotic sores which ordinary dressings cannot touch. Similar treatment directed to specific buboes is said to convert them into simple abscesses. The value of the warm bath, hot fomentations, and the at times much derided poultice in the treatment of angry and virulent forms of inflammation has been long admitted. It is possible that a more scientific explanation than has hitherto been forthcoming of the *rationale* of these familiar remedies is afforded by the present notions of attenuation. (*Lancet*, August 25, 1883.)

**Surgical Expedients in Emergencies.**—Dr. R. J. Levis, of the Pennsylvania Hospital, writes:—The exigencies of active surgical practice have frequently obliged me to rely on hastily devised resources, and I trust that the record of some of them which I recall may possibly be of benefit to the profession and a relief to human suffering.

The necessity for *evacuating an over-distended bladder* is liable to become immediately urgent on occasions when a catheter is not quickly obtainable. It is remarkable how often the condition is overlooked by practitioners until it becomes one of suffering and danger, demanding instant relief. The continued dribbling that often occurs from an almost bursting bladder may mislead or blind one to the grave danger. The absence of a catheter on one such pressing occasion led me to contrive a ready means of evacuating the urine. The recourse was to a piece of iron bell-wire, bent double on itself, and the blunt doubled end passed readily through the urethral tract to the bladder. The distension of the urethra by the doubled wire allowed the urine to pass freely between the wires.

*A female catheter* may be extemporised from a short piece of rye straw, the end of which is to be closely wrapped for a short distance with thread; or the end of the straw may have its sharpness removed by dipping into melted sealing wax. The stem of the ordinary clay tobacco-pipe is also efficient for the purpose. Such crude substitutes, when oiled, are readily introduced.

*The operation of venesection* would probably be more frequently resorted to when needed if a proper lancet, in perfect order, were at hand; but the critical time for relief of an actively congested or inflamed lung or brain is sometimes allowed to pass for want of a ready and certain method of opening a vein. I once, on a pressing occasion, bled a patient at the bend of the elbow, with perfect ease and precision, with but a blunt-pointed and dull pocket-knife, by resorting to a simple, convenient expedient. Having put on the usual constricting bandage to distend the veins, I first transfixed the most prominent vein with a fine needle. Thus held securely, it was very easy, with even the dull knife, to cut a valvular incision into the vein, and the blood flowed freely.

*For the arrest of nasal hæmorrhage* I know of no device so good as one that may be readily extemporised with a strong piece of cord and some small pieces of sponge. The cord is tied securely to a piece of sponge, cut rounded, and just large enough to be forced backwards through the nostril. Then a number of similar pieces of sponge, with a hole through the centre of each, are threaded successively on the cord. The sponge on the end of the cord is then pushed, with a probe or dressing forceps, through the nostril, quite back to the faucial orifice; and the rest of the threaded pieces of sponge are slid back, one at a time, until the nares are tightly filled. When the patient becomes secure against a repetition of hæmorrhage, the plugging is readily removed, one piece of sponge being withdrawn at a time, with the dressing forceps. The posterior nares may also be easily plugged by introducing either a slender gum (india-rubber) bougie or a piece of thick catgut string, with a cord attached, through the nares, catching one end of it in the fauces with forceps, and drawing it forward through the mouth. To the cord which follows, a piece of sponge or pledget of lint is tied, to be drawn up into the posterior nares. A method of making unirritating and painless pressure within the nares, in cases of obstinate epistaxis, is by a piece of the intestine of a chicken or other small animal, about twelve inches long, partially filled with either air or water. One end of the intestine is, while empty and collapsed, pushed backward through the nares; when thus lodged the air or water in the other end is forced, by compression with the hand from the pendulous portion, into the part lodged in the nares. Strong, equable compression can thus be made, rendering hæmorrhage impossible.

In a case of *hæmorrhage from the intercostal artery*, from homicidal stabbing, I arrested the flow immediately by making pressure within the pleural cavity, directly on the vessel, by introducing into the wound the handle of a door-key. The key was then turned transversely, so as to make direct pressure, and maintained in that position for some hours, until there was no more tendency to hæmorrhage. The same mechanical action might be effected by the similar use of the handle of an ordinary gimlet.

As a very efficient *substitute for Esmarch's elastic bandage*, I suggested, some years ago, in an article in the *Philadelphia Medical Times*, the use of a bandage made from ordinary flannel, cut bias, so as to increase its elasticity. Such an elastic bandage, from a material almost everywhere at hand, is, I know from experience, perfectly effective.

*The absence of a tenaculum* may be well replaced by a small fish-hook secured to a penholder.

*For dislodging a foreign body in the œsophagus* by forcing it downwards, an ordinary carriage or riding whip, knotted far enough from the end to insure the proper degree of flexibility, may be an efficient expedient in an emergency.

*Materials for splints* for the temporary dressing of fractures can be at almost all times extemporised from the materials of wooden boxes and binders' boards. To dress fracture of the fore-arm and of the leg, in a case required to be removed to a distance from the scene of the accident, I once improvised an efficient dressing by breaking into strips some ordinary palm-leaf fans, which were at hand, and bound them on the limbs. I commend the material for its merits of being elastic and conformable to the shape of the limb. Good temporary dressings can also be made from common straw, cut to proper length and bound in layers on the limb.

*For a readily made fixed dressing*, a plan I have resorted to is with ordinary sand-paper as the material. The sand-paper is dipped into warm water, to soften the paper and glue, and it is then applied and retained with a bandage. The glue of the sand-paper soon gives rigidity; body and firmness are produced by the sand and paper. Strong fixed dressings, it should be remembered, can be readily prepared with the familiar domestic commodity of starch, or with the combination of eggs and flour.

*In removing a patient with a fractured thigh or leg*, the uninjured limb can be made to temporarily act as a splint and take care of the injured one, by simply bandaging the limbs together.

A common gimlet is an *efficient instrument for opening the mastoid cells*, in cases of abscess, when there is grave threatening of cerebral complication, demanding prompt action.

The patient use of a carpenter's rasp may safely take the place of the *trephine*, in cases of fractured skull, by cutting away an angle or edge of bone at the point of fracture, and allowing an elevator, such as a small screw-driver, to be inserted beneath a depressed fragment.

The facility with which *rectal injection* can be performed with large quantities of fluids, by hydrostatic pressure, renders the use of a syringe not essential, if a piece of india-rubber tubing long enough can be obtained. The lower bowels may also be distended, in cases of intussusception, by injecting water and carbonic acid gas, forced from the ordinary mineral water bottle or siphon, fitted to the rectal tube. (*Trans. of Med. Society of Pennsylvania*, 1883.)

# Notes and Queries.

Allevard les Bains.—Dr. Aitken requests us to note an erratum in his paper on Allevard, where, at page 265, fifth line from the top, *tenuity* should be read instead of *density*. He also requests us to add that the latest measurement makes the daily supply about 900 hectolitres, or nearly 20,000 gallons, which seems to him much more likely to be accurate than the 880,000 gallons of Vintras, or the 4,400 of Durand Fardel.

International Exhibtion at Nice, 1883-4.—At a Meeting held at the Society of Arts on June 26th, 1883, the following circular was drawn up and approved by many of the most eminent physicians and surgeons in the kingdom:—

We beg leave to invite your attention to the accompanying classification of objects proposed to be exhibited in the Sanitary and Medical Section of the Exhibition which is to be opened at Nice in December next. We congratulate the Mayor and Municipality on their recognition of the fact that a health resort needs more than Nature, bounteous though she may be, can ever bestow. Nature gives warmth, bright skies, brilliant sunshine, but it is for man to care that nothing shall be found which can beget disease or hinder recovery. The sanitary condition of the Riviera is of vital importance to thousands of British subjects who annually visit it in search of health; and there can be no doubt that the Exhibition which is to be held will do much to stimulate sanitary progress throughout the entire district. The wise forethought of the authorities at Nice has led them to take the important step of organising this Exhibition, and we heartily wish success to the undertaking, and invite our countrymen to co-operate. We ask more especially for the co-operation of all whose occupations make them familiar with sanitary needs, and whose endeavours are constantly directed to supply them; such as engineers, architects, manufacturers of sanitary apparatus, as well as pharmaceutists, and the makers of various instruments. We earnestly recommend the undertaking to general support.

The Official Agents for Great Britain are Messrs. J. M. Johnson & Sons, Limited, 1, Castle Street, Holborn, London, to whom applications for space must be made, and from whom all information can be obtained. The classes of objects proposed to be exhibited in Section II. are :—Distribution and Purification of Water for Domestic Use; House Drainage and Sewerage; Hygiene of Public Establishments, of Houses, of Ships; Pharmaceutical Preparations; Mineral Waters; Medical and Surgical Instruments and Appliances; Veterinary Medicine; Hydrotherapeutics; Medical Gymnastics; Life Saving Apparatus; Ambulances, &c.; Special Treatises; Meteorology applied to Climatology; Meteorological Observations; Special Treatises. Plans. Charts.

## ERRATA.

In Dr. Leech's paper on "Spiritus Etheris Nitrosis" in the October PRACTITIONER the dose in Figs. 1, 2, page 244, *should be* "100 minims," *instead of* "2 minims."

*For* "Hermestadt," page 242, line 21, *read* "Hermbstädt."

In footnote page 243, *for* "chlorate," *read* "chloride."

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# Department of Public Health.

## MILK AS A VEHICLE OF INFECTION.

THE power of milk to convey infection on a wide scale has again been demonstrated in connection with the extensive epidemic of enteric fever in St. Pancras. Dr. Taylor of Penrith has, we believe, the credit of originally pointing out that infection had, in all probability, been communicated through the agency of milk, but it was Dr. Ballard who, in 1870, first demonstrated that enteric fever had, as a matter of fact, been distributed by means of milk; the outbreak in question having occurred in Islington, where Dr. Ballard at the time acted as medical officer of health. Since that date a considerable number of epidemics have been shown to owe their spread to the same agency; over seventy such instances are recorded in a tabular form in the *Proceedings* of the State Medicine Section of the International Medical Congress held in London in 1881, the diseases in question being enteric fever, scarlet fever, and diphtheria; and within the past two years fresh evidence has been adduced as to the influence of milk as a vehicle of infection. Notwithstanding the fact that the evidence on this point is now so complete, some observers still hesitate to accept it, and the more incredulous are to be found amongst French and German hygienists. The St. Pancras epidemic should however suffice as a final proof, for there has seldom been recorded so complete and so able a report on this question as that which Mr. Shirley Murphy, the medical officer of health for the district implicated, has recently submitted to his Vestry. Towards the end of July last it was noticed that enteric fever was present to an abnormal extent within a certain defined area, and by the middle of September as many as

431 cases had come under notice. The disease was not due to any pollution of the local water service, which was distributed by two different companies; and no local sanitary circumstance could be identified as its cause. The fact that certain of the families infected in the early stages of the epidemic had, though living somewhat widely apart, received their milk from one milk-vendor, afforded some suspicion as to the origin of the outbreak, and it soon became obvious that, in some way or other, the operations carried out at a special dairy were concerned in the distribution of the infection. The dairyman in question received milk from several farms in different parts of the country, and it was only as the result of a very exhaustive inquiry that Mr. Murphy was able, by a process of elimination, to identify one special farm at St. Albans with the production of the mischief. Inquiry at the farm then elicited the fact that a so-called case of pneumonia had occurred there on August 6th, the attack being accompanied by fever and diarrhœa, and that a boy who arrived at the farm on July 6th had sickened with enteric fever eight days after his arrival. And further, evidence was forthcoming to show that there existed facilities for the escape of the contents of a cesspool in the direction of the well which was resorted to in connection with the dairy operations. It was indeed finally demonstrated that the incidence of the enteric fever was specially upon the customers of one particular London milk-vendor, and that those who drank the milk in a raw state were more attacked than others; that the milk which was infective came from a special farm; that the infection it had received was operative for mischief before its arrival in London, as shown by an outbreak amongst persons who had consumed the milk both at St. Albans and along the line of railway to London; and lastly, that enteric fever had prevailed amongst the residents of the suspected farm under circumstances which favoured the supposition that the infection could have reached the well-water in use.

The circumstances detailed in Mr. Shirley Murphy's instructive report renew the interest which for some years past has been taken in the matter of milk and its pollutions, and the occasion is an opportune one to notice some remarks on this subject which, a short time since, were addressed by Dr. John Dougall to the Philosophic Society of Glasgow. In consequence of the great divergence of opinion which existed some years ago in regard to milk-poisoning, Dr. Dougall set himself to collate facts concerning it, and he made special examination as to the chemical constitution of milk with respect to its affording a favourable nidus for the reception and dissemination of zymotic poison; the result being that he arrived at the conclusion that sweet milk did constitute "a congenial soil for the preservation, and probably even the multiplication, of specific infections."

Dr. Dougall's present paper enters first into some details upon the composition and the peculiar changes to which milk is liable; he shows that it is a rich organic fluid—a solution in fact of the various chemical compounds by which the bodily structure is built up; he next details the process by which milk becomes acid, curdled, and putrid; and he points out that ordinary milk contains about 88 per cent. of its volume of water, a fluid which of all other natural bodies has probably the greatest solvent power. Enlarging upon this latter point, he adverts to the power of water in first absorbing and then condensing more gases than any other fluid, and especially such gases and vapours as are of an offensive nature; he calls to mind the fact that the offensive and unwholesome emanations from animal excretions—as from the urine, fæces, bowel gases, breath, and skin—are largely absorbed by water, and he infers that, since water enters so largely into the constitution of milk, the latter fluid has also the same power. Putting this matter to the test, he inclosed in a jar a portion of certain substances giving off emanations, together with a uniform quantity of milk, for a period of eight hours. At the end of that time a sample of milk was drawn by means of a pipette from the lowest stratum of the vessel exposed in the jar; and quoting from Dr. Dougall's paper we find that the following were the results of his experiments:—

1. Coal gas . . . . . . . . Smell in milk distinct.
2. Paraffin oil . . . . . . „ strong.
3. Turpentine . . . . . . „ very strong.

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| 4. Onions | Smell in milk | very strong. |
| 5. Tobacco smoke | „ | very strong. |
| 6. Ammonia | „ | moderate. |
| 7. Musk | „ | faint. |
| 8. Assafœtida | „ | distinct. |
| 9. Stale urine | , | faint. |
| 10. Creasote | „ | strong. |
| 11. Cheese (stale) | ,, | distinct. |
| 12. Chloroform | „ | moderate. |
| 13. Putrid fish | „ | very bad. |
| 14. Camphor | ,, | moderate. |
| 15. Decayed cabbage | „ | distinct. |

In several other instances the sense of smell was not alone relied on. Thus, (16) sulphuretted hydrogen, in addition to giving rise to a strong smell, indicated its presence by means of a black precipitate with sulphate of iron and ammonia; (17) ammonia gave a "moderate" smell to milk, and led to a black precipitate in the presence of sulphate of iron and sulphuretted hydrogen; (18) sulphide of ammonium gave rise to a strong smell in the sample, and was further indicated by means of a black precipitate with sulphate of iron; and (19) human fæcal matter gave a strong scent to the milk, and a black precipitate, indicating the presence of sulphuretted hydrogen, was produced on the addition of ammonia and sulphate of iron.

It thus became obvious that the milk had absorbed the emanations of all the substances to which it had been exposed, and it further transpired that all the specimens examined retained their distinctive odours for as long as fourteen hours after their removal from the glass jar in which they had been exposed.

Cream, according to Dr. Dougall, may be regarded as acting in much the same manner as milk; indeed, although it contains less water than milk, yet it has special qualities of its own which may perhaps make it even more liable to retain offensive and dangerous emanations than the parent fluid itself. Abundant evidence has however been given to show that far more care is needed in connection with the storage of milk than has heretofore been regarded as necessary, and this especially where milk or cream is kept in apartments or wards occupied by sick persons. If the emanations to which the milk is exposed are of a diseased and dangerous quality, it is all but impossible that the sample can remain free from offensive and dangerous properties, and it should become an invariable rule to keep as little milk as possible in sick rooms, and never to allow a supply which has been thus exposed to unwholesome emanations to be used for any other than ward purposes.

The experiments detailed only afford proof of the pollution of the exposed samples of milk, they do not show that the pollution was dangerous to health ; and it is obviously impossible to procure, by means of a scientific experiment, actual proof of the results which would follow on the exposure of milk to the emanations of persons suffering from the several specific infectious fevers. There is, however, abundant evidence to show that milk is capable of receiving the specific contagion of diseases such as small-pox, scarlet fever, enteric fever, and diphtheria, and of conveying them to others ; indeed it is assumed by some that it affords a medium specially favourable to the growth and reproduction of the particular poisons to which these diseases are due. Under these circumstances it has been lately held desirable to boil all milk which is open to suspicion before using it. In the course of several epidemics in which milk has acted as the vehicle of infection, it has been noted that persons who had only consumed it after it had been boiled escaped all ill results, whereas other members of the same family or community who had not taken that precaution had been attacked with disease. Dr. Dougall is strongly of opinion that none of the organisms to which the infectious fevers are alleged to be due can possibly withstand the temperature of boiling milk, a temperature which, as he points out, would utterly destroy every form of tangible ovum and every kind of visible seed known. Mr. Murphy would evidently go further in his precautions. In view of recent experience he advises that all milk, without reference to suspicion of infection, should be boiled before it is used as a beverage for the human subject. By nature milk was intended to pass direct from the milk gland of the mother into the stomach of her young, whereas the injurious properties it acquires, whether these be the result of mere putrefaction or of the absorption of some specific infection, are all brought about by one or more of the many processes to which this fluid is now subjected in its passage from the cow to the consumer. Hence special precautions become necessary in its use.

## EPIDEMIC OF CEREBRO-SPINAL MENINGITIS IN GREECE.

In an interesting memoir on epidemic cerebro-spinal meningitis by M. Ch. Pretenderis Typaldos, Professor of Clinical Medicine in the Faculty of Medicine of Athens, an account is given of such an epidemic, which took place in Greece in 1869. The prevalence commenced suddenly towards the end of December, 1868, in the southern part of the Peloponnesus, in the villages of Mount Taygetus, and shortly afterwards it appeared in numerous localities in the Peloponnesus, on the continent of Greece, as well as in the Cyclades, the places attacked being often wide apart. The occurrence followed on a period of intense cold, accompanied by a heavy snowfall on Mount Taygetus, and it was worthy of note that the cases observed about the Piræus and at Athens were all in persons who inhabited cold, damp, and miserable houses, whereas at Napoli, one of the towns which suffered, not a single instance occurred in the prisons, which at the time contained some five hundred persons; and no garrisons suffered except in towns where the disease was at the time prevalent. These facts rather point to the operation of some direct contagion, but M. Typaldos does not concur in such a view of the dissemination of the disease. In some localities children escaped, but in others a large number suffered. With regard to symptoms, it is noted that intense pain about the joints, resembling severe rheumatism, was noticed as an early symptom, and this, in districts where rheumatism is rare, and also that suppuration of the synovial membranes took place in some cases. Herpes labialis, often observed elsewhere, was rare, whereas in some of the more severe cases observed, for example at Cythium, black vomit took place. The epidemic was most severe at Tripolitza in Arcadia, on Mount Taygetus, and in Attica, more than half the cases terminating fatally.

When in 1866 Mr. Simon prepared a memorandum on this disease, which was then so fatally prevalent about the lower Vistula and in some other parts of North Germany, he regarded the disease as apparently belonging to the class of specific fevers. Its history was traced through a series of years, and it was shown that it had prevailed off and on in several parts of Europe, and especially in Northern Germany, for a considerable period, some of the epidemics having obtained a strong hold on the localities affected. But its tendency always has been not so much to diffuse itself widely over a large area as to give rise to small, compact epidemics, especially in localities where the dwelling accommodation has been marked by conditions leading to foul air within, and also, to some extent, of bad sanitary conditions without. That it is communicable in the same degree as such diseases as small-pox and typhus is evidently not the case, and the utmost that can be said as to the infection being at times conveyed by human intercourse is that it is certainly not thus diffusible in any high degree. Dr. Burdon Sanderson, F.R.S., as the result of his inquiries into the epidemics which had prevailed about the Lower Vistula,[1] reported that he had met with no facts which afforded ground for believing that the disease was communicated by personal intercourse, and certain considerations to which he attached importance tended towards a contrary inference. As in the case of the epidemic in Greece, he found that cold, damp, and bad dwelling accommodation—especially when the latter was associated with the gross conditions involving overcrowding and want of ventilation—were the special local peculiarities with which the epidemics he inquired into had been associated. The centre of epidemic area in Berendt and Carthaus was the summit of the Thurmberg, the highest point which lies between the Hartz and the Ural Mountains, a locality in which the winter had been both long and exceptionally severe. About the Vistula, on the other hand, where the climate is milder, the inhabitants were exposed to the influence of annual inundations and to the depressing effects which followed on the resulting pernicious intermittents. The disease, as an epidemic, is practically unknown in this country, and there is every reason to believe that, with its small tendency to spread in the lines of human intercourse, there is but little risk of its gaining a foothold on our shores. Much as we need increased ventilation and a lessening of overcrowding in the homes of our poorer population, together with a more efficient cleansing of the localities in which we live, yet, for the purposes of such a disease, we are in an incomparably safer position than those who inhabit houses which are fitted with stoves, in which ventilation is almost unknown from the beginning to the end of winter, and which are surrounded with conditions of filth exceeding in magnitude and in power for harm anything to which the generality of the poor in this country have for many years past been subjected.

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[1] Eighth Report of the Medical Officer of the Privy Council for the year 1865.

# CONTRIBUTIONS TO A STUDY OF THE CAUSES OF EPIDEMIC DIPHTHERIA.

BY ARTHUR DOWNES, M.D.

## I.—The "Normal" Age-Incidence of Diphtheria.

Just as Bretonneau himself lamented that Francis Home, by his treatise[1] and by the "fascination of a new name," had for more than half a century suspended progress in this field of medicine, so to many it is probably becoming apparent that a not dissimilar danger may attend the French physician's own term—diphtheria. Bretonneau in later years became aware of this. In his Fifth Memoir he says: "Perhaps I should have done more wisely in preserving this ancient name (*Malum Ægyptiacum*), but I have yielded to the desire of obtaining by a specific name the distinction of a specific phlegmasia . . . . The application of this name, made erroneously every day, proves to me that I was wrong."[2]

Is our present knowledge such that we can say, with the confidence one sometimes hears, or sees expressed in print, what is and what is not diphtheria? For my own part I am fain to confess that to me our pathology and classification of catching throat-illness generally appears indefinite and unsatisfactory. In regard to diphtheria in particular it seems to me that two main dangers of error beset the inquirer; the first, that one often finds all pseudo-membranous sore-throats indiscriminately regarded as diphtheria—using that word in the specific sense intended by Bretonneau—with no other proof of their specific nature than that they are pseudo-membranous; the second, that a large number of practitioners recognise nothing as diphtheria save what is visibly pseudo-membranous; no membrane, no diphtheria. And so Bretonneau's word is cramped and warped in use by its very derivation.

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[1] *An Inquiry into the Nature, Cause, and Cure of Croup*, 1765.

[2] Sydenham Society's Translation (from *Arch. Gén. de Médecine*, 1855), p. 177.

Error in either of these directions would retard the progress of medical knowledge but the second may be, and I believe is, fraught with danger to the public health. For the fact is patent that in unmistakable association with undoubted diphtheria we constantly find cases, chiefly sore-throats of varying severity, in which no membrane is discoverable from first to last. Such cases may be followed by characteristic paralyses; they may be contracted from typical diphtheria, and typical diphtheria in turn from them; frequently unrecognised, often disregarded, they are in my experience, and in the experience of others, common carriers of diphtheric contagion, and a solution, in part at least, of the frequent mystery of its spread.

The word diphtheria, then, though current coin of medical phraseology, having no mint standard, may represent to different minds as many values. It becomes necessary, therefore, that any writer on the subject, or any reporter of a diphtheric outbreak, should distinctly specify what he includes under that name. In the present article the word diphtheria is intended to comprise all kinds of sore-throat distinctly associated with outbreaks of throat-illness which were proved to be diphtheric by the occurrence of characteristic symptoms and—a most important point—of typical sequelæ; and the cases referred to, or from which statistics are derived, were, unless otherwise stated, cases of *epidemic* diphtheria.

Systematic writers state that the most obvious predisposing cause of diphtheria is *age*.

It is commonly recognised that children are the chief sufferers, and there is a belief that the school-going ages—say from three years to twelve inclusive—exhibit the greatest proclivity to this disease.

Probably this is in the main true, but the belief is largely empirical, and such statistics as have been advanced are for the most part open to grave objections; some, indeed, I venture to think, are for the particular purpose valueless.

For example, Dr. Morrell Mackensie,[1] after stating that age is the most obvious predisposing cause, quotes an analysis[2] of nearly 70,000 fatal cases of diphtheria in the Returns of the

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[1] *Diphtheria, its Nature and Treatment*, by Morell Mackensie, M.D. London, 1879.

[2] By W. N. Thursfield, M.D., in *Lancet*, ii. 1878.

Registrar-General, in which the age at death in each thousand cases was as follows:—

| | |
|---|---|
| Under 1 year | 90 |
| From 1 to 5 years | 450 |
| ,, 5 ,, 10 ,, | 260 |
| ,, 10 ,, 15 ,, | 90 |
| ,, 15 ,, 25 ,, | 50 |
| ,, 25 ,, 45 ,, | 35 |
| ,, 45 years and upwards | 25 |

He considers these figures to be markedly different from any which could be compiled of other zymotic diseases, and infers that "the disease is comparatively rare in children in their first year." But in advancing these facts as evidence of age-proclivity to diphtheria, Dr. Mackensie takes neither account of the relative numbers living at each age, nor of the relative number of attacks at each age, nor yet of differences of risk to infection which may attach to the various age-groups, and influence the result quite independently of age *as age*.

Thus, as regards numbers living at each age, he would have found that the proportion of deaths of children under one year of age, relatively to their numbers, is, according to the table which he quotes, greater at that age than at any other age-group, with the exception of group 1-5 years.[1]

Nor would the assertion seem more correct that the age-incidence of diphtheric mortality differs markedly from the corresponding age-incidence of any other zymotic disease.

From the Returns of the Registrar-General for 1861-70, I have compiled the subjoined table (I.).[2]

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[1] The numbers living at each age-group are not given by Mackensie, nor are they to be found in the original from which he quotes. I have assumed, therefore, that they were proportionately identical with the mean population at each age for England and Wales, 1861-70. A table of like kind, compiled by Jacobi from the returns of certain of the States, U.S.A., given in the *Transactions of the International Medical Congress in London in* 1881, is similarly invalidated. So, also, statistics in Meigs and Pepper's excellent *Treatise on the Diseases of Children*, fifth edition, pp. 655, 656.

[2] These tables are based on :—

94,099 deaths from measles.
112,800 ,, ,, whooping-cough.
207,867 ,, ,, scarlatina.
39,454 ,, ,, diphtheria.

## TABLE I.—*England and Wales*, 1861—70.

AVERAGE ANNUAL NUMBER OF DEATHS FROM CERTAIN CAUSES AND AT CERTAIN AGES TO 100,000 LIVING AT THOSE AGES.

MALES.

| Causes of Death | All Ages | —1 | —2 | —3 | —4 | —5 | 0—5 | 5—10 | 10—15 | 15—20 | 20—25 | 25—35 | 35—45 | 45—55 | 55—65 | 65—75 | 75—85 | 85 + |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Population, 1861-70... | 10,117,596 | 321,315 | 284,789 | 287,174 | 278,145 | 273,962 | 1,445,685 | 1,261,890 | 1,140,330 | 1,021,321 | 906,063 | 1,492,788 | 1,186,127 | 904,120 | 602,559 | 329,612 | 113,350 | 13,751 |
| Measles ......... | 45 | 296 | 611 | 320 | 163 | 97 | 306 | 23 | 2 | — | — | — | — | — | — | — | — | — |
| Scarlatina ...... | 101 | 220 | 538 | 596 | 579 | 471 | 474 | 221 | 46 | 11 | 8 | 1 | 2 | 1 | — | — | — | — |
| Diphtheria ...... | 17 | 66 | 92 | 76 | 79 | 65 | 75 | 33 | 10 | 5 | 3 | 2 | 2 | 2 | 3 | 3 | 3 | 2 |
| Whooping cough | 48 | 698 | 536 | 227 | 113 | 59 | 339 | 12 | — | — | — | — | — | — | — | — | — | — |

FEMALES.

| Causes of Death | All Ages | —1 | —2 | —3 | —4 | —5 | 0—5 | 5—10 | 10—15 | 15—20 | 20—25 | 25—35 | 35—45 | 45—55 | 55—65 | 65—75 | 75—85 | 85 + |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Population, 1861-70... | 10,971,649 | 318,991 | 288,727 | 287,597 | 278,161 | 271,868 | 1,440,344 | 1,263,106 | 1,124,378 | 1,035,266 | 1,011,063 | 1,675,169 | 1,278,785 | 963,116 | 672,990 | 381,952 | 142,712 | 21,898 |
| Measles ......... | 42 | 250 | 603 | 326 | 173 | 99 | 292 | 25 | 3 | 1 | 1 | — | — | — | — | — | — | — |
| Scarlatina ...... | 93 | 184 | 495 | 584 | 557 | 461 | 450 | 214 | 53 | 15 | 10 | 7 | 3 | 1 | 1 | — | — | — |
| Diphtheria ...... | 19 | 50 | 89 | 81 | 87 | 81 | 77 | 44 | 16 | 6 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| Whooping cough | 566 | 752 | 678 | 318 | 170 | 90 | 413 | 18 | 1 | — | — | — | — | — | — | — | — | — |

Table I. shows the mortality from four zymotic diseases of males and females at certain ages per 100,000 living at each age-group, taking the means of enumerated populations 1861 and 1871.

It will be seen that in each case the main incidence of mortality is on the first five years of life. In measles and in whooping cough the highest rates fall on the first three years, in diphtheria and in scarlatina on the second, third, fourth, and fifth years. The actual year of life in which the greatest mortality occurs is :—

| | |
|---|---|
| Measles . . . . | Second year. |
| Scarlatina. . . . | Third „ |
| Diphtheria . . . | Second „ |
| Whooping cough . . | First „ |

But even when thus corrected such statistics prove nothing more than that in this country from 1861—70 the death-rate from diphtheria was greatest at the ages named. It would be most fallacious to draw from them conclusions as to age-predisposition to diphtheria.

For excess of death-rate at a given age might alike result from a corresponding excess of attacks, or from a greater tendency to death at that age.

For the further consideration of the problem we need information as to relative incidence of attacks at different ages, and as to mortality relatively to the number of attacks at each age. As regards mortality, it would not be difficult to obtain data on a considerable scale.[1] The following figures, compiled from my note-books, while serving as a contribution to any future attempt to determine this matter by adequate statistics, may suffice as an indication for our present purpose :—

TABLE II.—*Mortality from Diphtheria at Different Ages, relatively to Attacks at those Ages.*

| Age ... ... ... | All Ages. | -1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | -10 | -11 | -12 | -13 | -14 | -15 | -15+ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Attacks ... ... ... | 436 | 4 | 3 | 19 | 25 | 34 | 41 | 30 | 39 | 24 | 22 | 24 | 22 | 18 | 8 | 17 | 106 |
| Deaths... ... ... ... | 76 | 1 | 1 | 12 | 11 | 5 | 10 | 7 | 9 | — | 4 | 5 | 3 | 1 | 1 | 1 | 5 |
| Percentage of deaths to attacks... ... | **17·** | | | **35·** | | | | | **19·** | | | | | **12·** | | | **4·** |

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[1] In the absence of registration of attacks of zymotic disease, the Collective Investigation Committee of the British Medical Association might, I venture to think, contribute largely to the solution of this and of other similar questions.

TABLE III.—*Age Distribution of Attacks* (TABLE II.) *expressed as Proportional Parts of* 100.[1]

| Age ... ... ... | 0—5 | 5—10 | 10—15 | 15 + |
|---|---|---|---|---|
| Age-distribution (estimated from census, 1871) in districts from which Table II. is compiled ... ... | 14 | 12 | 11 | 62 |
| Corresponding distribution of diphtheria attacks, Table II. ... ... ... | 19 | 36 | 20 | 24 |
| Comparative incidence of those attacks on each age-group relatively to numbers living at each age-group ... ... ... ... | **20** | **45** | **27** | **5** |

[1] Fractions omitted.

Provisionally accepting these figures as affording, *faute de mieux*, a general indication of the truth, we should conclude that, although the first quinquenniad of life has the greatest relative mortality from diphtheria, it is on the second quinquenniad that the greatest proportion of attacks falls.

Still this would not determine the value of any special age-proclivity, *quâ* age, for it might be that children aged 5—10 are more exposed to risks of infection than other persons. To avoid error from this source we require observations on a population of mixed ages exposed uniformly to such risk. Opportunities for obtaining strictly accurate data on this point, numerically sufficient to minimise the chances of error, must be extremely rare.

Mr. W. H. Power has made an ingenious attempt[1] to determine what I may term the "normal-age incidence" of diphtheria from the proportionate number of attacks on persons exposed to risk of infection in their own homes.

In the following table I have applied this method to 527 such persons, noted in my own journals, excluding all whom I knew to have been exposed to other sources of infection within four days of their attacks :—

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[1] In various Reports to the Local Government Board on outbreaks of diphtheria.

TABLE IV.—*Population exposed to Home-Risk of Infection.*

| Age. | Numbers living at each age. | Numbers attacked. | Percentage attacked. |
|---|---|---|---|
| 0—5 | 91 | 26 | **28·** |
| 5—10 | 84 | 31 | **37·** |
| 10—15 | 83 | 22 | **26·** |
| 15 + | 269 | 38 | **14·** |
| All Ages | 527 | 117 | **22·** |

With a different age-grouping, and on a larger scale (since I am able to include additional data from Mr. Power's own reports) the results are as follows:—

TABLE V.—*Population exposed to Home-Risk of Infection.*

| Age. | Numbers living at each age. | Numbers attacked. | Percentage attacked. |
|---|---|---|---|
| 0—3 | 79 | 10 | **12·** |
| 3—12 | 295 | 116 | **39·** |
| 12—15 | 84 | 22 | **26·** |
| 15 + | 528 | 77 | **14·** |
| All Ages | 986 | 225 | **22·** |

It would appear, therefore, that the "normal" or physiological age-proclivity to diphtheria is greatest at ages 3—12, and 12—15, being greater at the former age than at the latter by about one-third. The diphtheria proclivity of children aged 3—12 would seem, moreover, to be about thrice as great as that of either younger children or of adults.

*(To be continued.)*

# THE PRACTITIONER.

DECEMBER, 1883.

## Original Communications.

# ON THE TREATMENT OF THE NIGHT-SWEATING OF PHTHISIS.

BY WILLIAM MURRELL, M.D., F.R.C.P.

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(*Continued from* vol. xxix. p. 339.)

### XIV. Physostigma and Eserine.

In a clinical lecture delivered at the Pennsylvania Hospital, Dr. Da Costa speaks well of physostigma as a remedy for this distressing affection. He says "In a man with advanced tubercular consumption attended with profuse night-sweats, two minims of fluid extract of physostigma were given; he was sweating at the time; his respirations were 30; the pulse, 120; the temperature 100°. In an hour afterwards the skin was almost dry; respirations were 24, the pulse was 104, the temperature 96°·6; it rose in two hours after this to 97°·8. There had been no unpleasant effect except great thirst. In another case we first noticed the sweating carefully, while a placebo only was given. It came on profusely at midnight, and while profuse the respirations were 32, the pulse was 122, the temperature 97°; the sweating lasted four hours; as it passed away, the respirations were 28, the pulse 114, the temperature 99°·8. At the same period of the next twenty-four hours, and when the sweating had fairly begun, although the temperature then was 99°·5, a dose of two minims of the fluid extract of Calabar bean checked the sweating in an hour and a half, the temperature rising to 100°·6. In a third case of marked phthisis with night-sweats, the temperature before the sweats at 3 P.M. was 100°·5; in an hour afterwards with a profuse sweat it had declined to 98°·6; four minims of the fluid extract were then given, the sweat was completely checked in an hour, the temperature rising to 99°; there was no decided effect on the pupil and no unpleasant symptom. In a fourth case the profuse early morning perspirations were arrested in two hours by the same dose, the pupils being slightly contracted, the pulse becoming less strong, the temperature declining from 100° to 97°·6."

On theoretical grounds it might be supposed that physostigma would be useful in the treatment of sweating. It is allied in its physiological action to jaborandi, pilocarpin, and muscarin, whilst it is antagonised by atropin, daturin, hyoscyamin, and homatropin.

I have used physostigma and the salts of its alkaloid in the treatment of the night-sweating of phthisis for nearly two years, and have notes of over fifty cases. Of these thirty-three were males and seventeen females. Of the adults thirty-eight were between the ages of twenty and thirty-nine. The oldest patient was forty-nine, the youngest was a girl of four. They were all out-patients at the Royal Hospital for Diseases of the Chest, and they were all suffering from phthisis. Their symptoms were those usually met with in these cases—cough, expectoration, more or less hæmoptysis, loss of flesh, and night-sweating. With regard to physical signs, all stages of the disease were represented; in some there was simply consolidation, others had moist sounds over the chest, and in others again the indications of the existence of a cavity were apparent. The sweating was in every instance profuse, only well-marked cases being selected for observation. It is hardly necessary to say that whilst the physostigma was being taken no other treatment was adopted. The only exception to this was in the case of cod-liver oil. If the oil had been taken continuously for some time, it was thought better to allow the patient to go on with it rather than to introduce a disturbing element by discontinuing its use.

Of the fifty cases thirty-four were treated with physostigma itself. The preparation was the extract, the dose one-tenth of a grain made into pilules with sugar of milk. In ten cases one pilule only was given at bedtime, and in eight of these the sweating was completely arrested by the fourth or fifth night. Of the two cases of failure one was relieved by two pilules of physostigma at bedtime, and the other by a twenty-grain dose of agaric. In twenty-four cases the physostigma pilules were given three times during the night, and this gave even better results. In most cases the sweating was checked the first or second night, and in every case it had almost ceased by the end of the week. In some cases where there was profuse sweating during the day as well as at night, a pilule was given every four hours. The dose is too small to produce "untoward effects," and no hesitation need be felt in repeating it frequently. The sweating once stopped does not as a rule return for three weeks or a month, but at the expiration of that time it is usually necessary to resume the treatment. In two cases in which the physostigma failed to act promptly, Shoemaker's oleate of zinc was used as a dusting powder at bedtime with excellent effect. This new oleate is a beautiful greyish-white soft powder, but as it has a slight though hardly perceptible odour, it should be prescribed with the addition of $\frac{1}{500}$ part of thymol. The combination is a pleasant one and succeeds admirably, not only in excessive sweating, but as a remedy for many acute and irritable skin diseases.

I have used three salts of eserine—the hydrobromate, salicylate, and sulphate, and all three answer equally well. The dose best adapted for the treatment of excessive sweating is the sixtieth part of a grain, and this may be conveniently made into pilules, one to be taken three or four times during the night. In fifteen consecutive cases in which I gave them I had no failures, although it is hardly likely that this mode of treatment will succeed in every case.

Physostigma is undoubtedly a good remedy for excessive sweating, but there is no reason to suppose that it will take the place of other and better known modes of treatment. It may be said that we have now so many remedies for sweating, that practically it is not desirable to extend the list. This may be true, but on purely pharmacological grounds the use of Calabar bean to check sweating is of interest.

In one case of phthisis I gave the patient at intervals six hypodermic injections of a sixtieth of a grain of sulphate of eserine. The temperature was taken every four hours for six weeks, but I could not see that it influenced it in any way.

# ON SORE THROAT IN CHILDREN.

BY HENRY ASHBY, M.D. LOND., M.R.C.P.

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THE examination of the fauces in children, especially of small and fractious ones, is not always an easy proceeding, and one often neglected: it needs a good light and some little patience and adroitness on the part of the observer to make a satisfactory exploration of the fauces of a whimpering and fractious child. Yet from a diagnostic point of view no examination of a feverish child is complete without a thorough investigation of the throat, and many wrong diagnoses have been made for want of such a very obvious precaution. A mother may bring a feverish child for examination, make no mention of, or deny the existence of a sore throat, the chest may be stripped and examined, perhaps more or less bronchitis detected, there may be no rash, or one easily overlooked, and an entirely wrong diagnosis may be made, when an examination of the fauces would have revealed tonsils covered with exudation, or the soft palate commencing to slough. A child may be brought with a swelling over the seat of the submaxillary or cervical glands with feverishness; the mother may lay stress on the pain in swallowing, and a diagnosis of diphtheria or scarlatina made, when indeed the case was one of "mumps." As a matter of fact, I have seen a case of mumps sent into a fever hospital, and contract scarlet fever while there. The importance of ascertaining the state of the fauces in a sick child can hardly be over-estimated, for on our decision may depend some very weighty considerations. Is the child suffering from scarlet fever? Are we to send it to a fever hospital or allow it to mix with its companions? The risks are that if we are wrong in our diagnosis, and if we send it into a fever ward, it may contract the very disease it was sent there to recover from, or on the other hand that it may be the means of spreading the disease, and run serious risks of nephritis and other complications.

Every one must know how easy it may be, yet how difficult it often is, to obtain a satisfactory view of the fauces of a child; sometimes one's finger passed into the mouth and made to depress the tongue will suffice, but often corruption and bribery are alike unavailing, and it is necessary to pass a metal spatula with a bent handle between the teeth to the back of the tongue, while an assistant secures the hands, and by the aid of a bright light explore the fauces and tonsils. But having thus obtained a careful view, it must be admitted that our difficulties in diagnosis are by no means at an end. Is the tonsillitis a simple inflammatory affection, or is it linked with a scarlatina or a diphtheria? This is a question, unfortunately, that does not always admit of an answer, for the symptoms of scarlet fever shade away imperceptibly into a slight sore throat, as the symptoms of typhoid may tail off into a diarrhœa or gastro-intestinal catarrh. It is an often noted fact how frequently the attendants on those sick with scarlet fever suffer from sore throats, and how often during the prevalence of an epidemic of typhoid many suffer from diarrhœa, who in no other way present symptoms of fever.

The functions performed by the tonsils are by no means certain; there can, however, be little doubt, from a consideration of their lymphoid structure, that they belong to the lymphatic system. They have been justly compared to Peyer's patches, from their consisting largely of lymph follicles resembling the "solitary glands" of the intestine—and indeed similar single lymph follicles are scattered about beneath the mucous membrane of the pharynx and root of the tongue. They have a large blood supply, the lymph sinuses around the follicles freely communicate with the neighbouring lymphatics, their deep connexions being with the cervical glands situated behind the angle of the jaw and near the bifurcation of the common carotid. Their surfaces are covered with small clefts or crypts which appear to increase the surface of the mucous membrane with which they are covered, and are the seat of the yellow spots seen in catarrhal tonsillitis, this appearance being due to cheesy secretion imprisoned in the crypts.

Putting on one side some of the rarer forms of sore throat, at least rare as far as childhood is concerned, namely, syphilitic or tuberculous ulceration, abscess, and also the congested throats seen at times in typhoid, measles and rötheln, we may divide the more important forms into, 1, Catarrhal tonsillitis; 2, Scarlatinal tonsillitis; 3, Pseudo-diphtheritic tonsillitis; 4, Diphtheria.

1. *Simple Catarrhal Tonsillitis.*—Weakly children, especially the so-called scrofulous, are liable to catarrhs of various mucous membranes and secondary enlargement of their corresponding lymph glands; such subjects suffer from bronchitis and enlarged mediastinal glands, intestinal catarrh and enlarged mesenteric glands, catarrh of the soft palate &c., enlargement of the tonsils and deep cervical glands; such attacks are apt to leave the glands enlarged and indurated, so remaining long after the primary catarrh has passed away.

It is also clearly recognised that tonsillitis is apt to precede or accompany the various manifestations of rheumatism. The exciting cause in such attacks is probably cold, still it is perhaps worth noting that tonsillitis does not often accompany a nasal catarrh, the latter generally passing down to the larynx and bronchi and giving rise to laryngeal and bronchial catarrh, the tonsillitis occurring by itself or perhaps in association with some gastric or hepatic derangement. In other words, the tonsils are associated with the alimentary rather than the respiratory system, participating in the disorders of the former rather than those of the latter.

What are the symptoms of a moderately acute attack of tonsillitis in a child? The attack generally begins with a feeling of chilliness or heat, there is rarely vomiting or retching, the temperature rises in the evening it may be to 103°, the tonsils are swollen often unequally, and congested, the mucous membrane of the soft palate is more or less injected, there is much extra secretion of mucus, and in a few hours yellow spots make their appearance on the tonsils, the results of the secretion retained in the crypts. The tongue becomes furred; the temperature may fall next morning to normal, to be intermittent for a few days till it finally remains normal. Such attacks are in all probability the result of several disorders and constitutional states, among which possibly cold, inhalation of sewer or foul gases, some specific poison as that of scarlatina or diphtheria, may play a part. One thing is certain, that attacks of tonsillitis while occurring sporadically often occur in epidemics, sometimes one child in a school or hospital ward, at other times a number, being attacked. Simple catarrhal tonsillitis remains from first to last an affection of the mucous membrane covering the tonsils and soft palate, and does not involve the parenchyma of the tonsils or exhibit any tendency to involve the nasal or laryngeal mucous membrane, or lead to purulent infiltration of the middle ear. There is no true ulceration of the tonsils or sloughing of the soft palate or cellulitis around the cervical glands, and in any case which exhibited any such tendencies I should strongly suspect some specific fever. May such a simple tonsillitis be the result of the poison of scarlet fever? Unquestionably yes, mild cases may occur with no rash, only a few degrees of fever and a simple tonsillitis, and yet be followed by nephritis. Cases of undoubted scarlet fever may occur in a ward or household to be followed by the occurrence of simple tonsillitis more or less widespread, and such cases of sore throat may be perfectly indistinguishable from an ordinary catarrhal tonsillitis.

One of the most striking epidemics of sore throat that I have seen, occurred in the autumn of 1881 in a ward containing twenty-six beds occupied by children. The first case was that of M. W., *æt.* three years, admitted October 20th, for rickets and slight bronchitis. The temperature which had been about normal, rose to 100·2 on the evening of the 23rd, and the following evening it was 103·4. The temperature continued intermittent, at one time reaching 105°, but fell to normal by the seventh day (see Chart 1). The pulse varied from 120 to 135, the tonsils were enlarged and congested, patches of yellow exudation readily removed by a brush appeared on their surfaces, the soft palate was congested, there was a discharge from the nose, slight enlargement of cervical glands, a furred tongue, no enlarged fungiform papillæ, no rash. In a few days the congestion of the fauces disappeared, but the tonsils remained large.

In the second case, Beatrice A. M., *æt.* three years and eleven months, was admitted October 20th for psoriasis into the same ward as Maggie W. On the 28th, three days after M. W.'s attack, the afternoon temperature rose to 104·4, the tonsils were congested, and small yellow spots were visible on the surface, there was no characteristic rash, only the peculiar local redness about the limbs due to the application of ung. acid. chrysophanici; there was slight enlargement of the cervical glands.

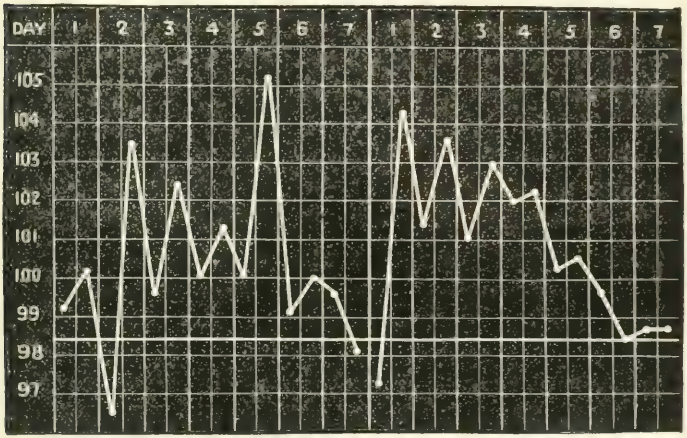


CHART 1.—M. W., *æt.* 3 years. Tonsillitis.

CHART 2.—B. A. M., *æt.* 3 years 11 months. Tonsillitis.

The tonsils remained congested for several days, the temperature gradually declined, and reached the normal on the sixth day (see Chart 2).

A third case occurred in a boy, *æt.* ten years, admitted for chorea; he complained of sore throat on October 28th, the tonsils were congested and covered with yellow points, the temperature varied from 99 to 100·4 for three or four days, the pulse was accelerated: all the symptoms disappeared in a few days.

A fourth case was that of a boy *æt.* four years admitted for rickets; he had a sore throat and slight feverishness on November

1st, the temperature remained elevated from 100—100·4 for about a week, when all the symptoms passed away.

A fifth case occurred in a girl *æt.* five years, admitted for glosso-laryngeal paralysis, eclampsia and semi-dementia; she contracted a tonsillitis on November 7th. The tonsils at first were large and red, afterwards sloughy-looking patches made their appearance on the surfaces, to be followed by deep and irregular ulcerations. The temperature followed an intermittent type at first, 99—101, later taking a higher range, 100—104; the cervical glands became swollen, cellulitis and erythema appeared, the nasal mucous membrane became involved. She died on the eleventh day of her illness; for the last few days she was unconscious and epileptiform fits occurred.

The sixth case was that of a girl of eleven years admitted for chorea; she had sore throat on November 9th. The temperature varied from 101—103 for five or six days, the fauces congested and tender.

The seventh case, a boy admitted for broncho-pneumonia; he was convalescent on November 11th, when he had a slight sore throat and feverishness for a few days.

The eighth case was a boy, aged seven years, admitted with eczema, he had a tonsillitis and feverishness for a few days.

No other cases occurred among the children after this—though several cases occurred among the nurses. What was the true nature of this epidemic tonsillitis? With the exception of the fifth case, the girl with semi-dementia and fits, the attacks resembled simple catarrhal tonsillitis, the first two cases being fairly severe, the later mild and evanescent. The fifth case was peculiarly severe, much resembling the sloughing of the throat seen at times in scarlet fever—probably the severity of the case and the fatal result was due to the cerebral disease from which the child had suffered for some years. Were these cases due to scarlatinal poison? Yes, I think so, but no certain answer can be given; the first case to occur had been exposed to scarlatinal infection, having sat near a case of scarlet fever in the out-patient room, but on the other hand no one of the cases had a rash, or the characteristic tongue, or suffered from any of the scarlatinal sequelæ; six out of the eight had never had scarlet fever; two, the sixth and seventh cases, had had scarlet fever three or four years before. There was nothing insanitary found in the condition of the ward, which is large and airy and contains about 1,600 cubic feet per cot. Such epidemics of sore throat are far from uncommon; the cases as they occur should be carefully isolated, and the most rigid scrutiny employed to discover their nature, attention being especially directed to the question of scarlatina and insanitary conditions.

2. *The Tonsillitis of Scarlet Fever.*—In typical examples there is no disease so easy to diagnose as scarlet fever, but it must be said also that there is no disease that at times presents greater difficulties. The onset is sudden and abrupt, and is nearly always accompanied by vomiting, often diarrhœa. The child perhaps appears well in the morning, goes to school, comes home feeling tired, takes its dinner and then vomits several times; towards evening there is chilliness, sore throat, and fever, the temperature rising possibly to 104 or 105, often the temperature never reaches so high, being not more than 100 or 101. In weakly children the fever is apt to be of an intermittent type, touching normal, or thereabouts, the next morning, but in most cases the evening temperature is maintained next morning, or there is only a slight remission. In a well-marked case the mucous membrane of the uvula, soft palate, and tonsils is injected, having a bright red appearance; the tonsils are generally swollen equally and may nearly meet, the secretion of mucus is increased, yellow points appear on the surface, sometimes patches of yellowish exudation are present. Frequently a semi-purulent discharge appears from the nose, and the cervical glands become enlarged and tender. The tongue is coated with a white fur of varying thickness, and cleans from the edges, displaying the well-known "strawberry tongue" in which the fungiform papillæ are engorged and appear to stand out from a smooth, bright, red ground. In the more severe forms, the tonsils, uvula, and edge of the soft palate, become covered with a yellowish exudation, ulceration of the tonsils ensues, their surfaces are ragged, and perforation may take place through the soft palate.

Too much care cannot be bestowed in all cases of sore throat in examining the child when completely stripped in order to detect the faintest rash. This rash does not consist in a blush or light erythema which may be present in the evening and gone before morning. The true rash is punctiform, that is, it consists of a number of fine or coarse red points, the congested hair-follicles, the intervening surface of the skin being either pale as in patients with a faint rash, or bright red from the presence of an erythema surrounding the hair-follicles. The scarlatinal rash may thus consist of a number of bright points on a pale or on a red ground. Sometimes the rash is patchy or irregular on the limbs, thus in some respects resembling measles, this variegated appearance being produced by the presence or absence of the erythema around the congested hair-follicles. The rash appears first about the neck, but sometimes it may be detected earliest about the backs of the hands. The rash fades in a few days; sometimes when it has only been slight, it has disappeared by the third, but oftener not till the fifth or seventh. It is nearly always followed by desquamation, but it is important to remember that in mild cases there may be no desquamation whatever, and also that children often desquamate after pneumonia, typhoid, or other febrile diseases.

The difficulties in diagnosis presented by scarlet fever principally occur when no characteristic rash is present, or when the case is only seen after the end of the first week, and no history of a rash is to be obtained and no desquamation is present. It is very important to bear in mind that at times no diagnosis is possible, that no conclusion can perhaps be arrived at as to the nature of the disease at any time during its course, and that it is necessary to carefully exclude from their fellows all cases of feverish sore throat as long as any congestion of the fauces remains.

How mild an attack of scarlet fever may be, and how slight may be the throat symptoms, and how easily the nature of the disease may be overlooked, the following case will illustrate. B. W., *æt.* 6 years, was sent into the fever ward, in the belief that he was convalescent from a mild attack of scarlet fever. He was admitted on July 11th, he had some redness about the face and fauces, and a normal pulse and temperature. He continued well till the evening of the 16th when he vomited, his pulse was 136, temperature 97·8, no rash, some redness of fauces. 17th (see Chart 3), enlarged congested tonsils, fauces red, faint punctiform rash. The temperature and pulse had become normal by the third day, and the rash disappeared a day or two after. In this case, one of undoubted scarlet fever, the temperature was never above 100.4, and the tonsils and fauces were only slightly congested and swollen.

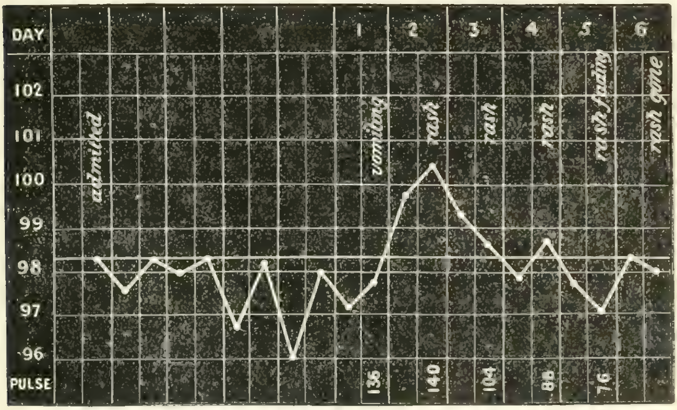


Chart 3.—B. W., *æt.* 6 years.
Scarlatina contracted in fever ward.

The tonsillitis of scarlet fever is often almost, generally indeed in mild cases absolutely, indistinguishable from that of simple tonsillitis. There are the swollen congested tonsils, the yellow spots of inspissated secretion marking the position of the crypts, the excess of mucus, the injected uvula and soft palate, and the pain in swallowing. It may not be possible to make a certain diagnosis, but any helps, however slight, are welcome. In the initial stage, the presence of vomiting and diarrhœa, a pulse of 130—160, though the temperature may not be high, marked injection of the uvula, edges of the pillars of the fauces, and tonsils, will serve to render it extremely probable that the case is one of scarlet fever. In the course of a day or two as the tongue cleans and displays the clean red surface with enlarged and congested fungiform papillæ, or the nasal mucous membrane becomes involved, the cervical lymphatics enlarged and tender, or surrounded by cellulitis, or yellow exudation appears over the inner surface of the tonsils and uvula, the probability of the scarlatinal nature of the attack becomes a tolerable certainty.

True ulceration of the tonsils, or sloughing, or gangrenous condition of the throat is almost certainly due to scarlet fever if diphtheria can be put out of the question. Sequelæ such as otitis or nephritis would be conclusive as to the nature of the attack.

3. *Pseudo-Diphtheritis.*—A form of sore throat which occurs both sporadically and epidemically, which has received the name of *angine couenneuse*, croupous angina, or pseudo-diphtheritis, seems to bear the same relation to true diphtheria that epidemic tonsillitis bears to scarlatina. Just as we recognise a form of feverish sore throat that passes from child to child in a ward, or family, or school, that has a striking resemblance to scarlatina but without its rash or sequelæ, and that appears to be due to a similar but modified form of poison, so we can recognise sore throat also apparently contagious which present many striking points of resemblance to diphtheria, and yet which we can hardly affirm are the genuine affection. This form of sore throat appears to prevail in districts especially noted for the prevalence of diphtheria, and some believe they can always connect their presence with foul smells or sewer gas leaking into the tenements. In its onset it resembles catarrhal tonsillitis rather than diphtheria, for it is generally sudden, and the temperature usually rapidly rises to 103—104. It may be at first one-sided, afterwards both sides being equally affected. The tonsils are congested, swollen, and patches of grey or greyish-yellow membranous exudation are seen on their inner surfaces, the membrane is tenacious and tough, but less so than that of true diphtheria. Membranous exudation may also be present on the uvula and soft palate. These attacks, though closely resembling true diphtheria—so much so, that in some cases the diagnosis may be impossible—yet they differ in that the cervical glands are rarely affected, the membrane is less tough, and the injection of the mucous membrane less, the nasal mucous membrane is unaffected, there is no albumen in the urine, and the attack is not followed by the usual sequelæ. The constitutional symptoms are less marked by depression of the whole system. Such attacks are often spoken of as diphtheritic sore throats, and are prone to affect both children and young adults, the prognosis is good, and in a week more or less the patient is convalescent.

It sometimes occurs, but rarely, that membranous exudation is seen on a tonsil that is the seat of suppuration; on one occasion I saw this in the post-mortem room, the tonsillitic abscess being unsuspected during life. Henoch also speaks of having seen such cases.

4. *Diphtheria.*—The characteristic appearances in pharyngeal diphtheria are well known. The onset is for the most part insidious, and, unlike scarlet fever, there is no sudden onset of fever. Sore throat or difficulty of swallowing is complained of, or perhaps a fœtid discharge from the nose, or swelling of the cervical glands with cellulitis, first calls attention to the case. Probably at the first examination the white or grey patches of exudation will be seen on the uvula, edge of soft palate, or tonsils, while the mucous membrane around is intensely injected. The membrane is raised, not readily separating from the mucous membrane beneath, and if separated leaves a bleeding raw surface; there is often much excess of mucoid secretion, the nasal mucous membrane becomes involved and a sanious discharge from the nose takes place. The temperature is not often high, being as a rule not higher than 100—102, the pulse is weak, the face pallid, the urine is loaded with albumen and less often with blood. The only diseases with which pharyngeal diphtheria is likely to be confounded are, in the mild cases, pseudo-diphtheritis, and in the severer forms malignant scarlatina *sine eruptione.* In the latter case a difficulty may occur when in malignant scarlet fever membranous exudation forms on the throat, the nasal membrane, or the conjunctiva, especially if such a case is not seen from the first and no history of a rash is to be obtained. A difficulty does not often arise in the diagnosis. In scarlet fever throats true membrane is rare, the tonsils may be covered with yellow exudation, sloughing and perforation of the palate and much external cellulitis take place, but there is an absence of the leathery whitish exudation adhering firmly to the mucous membrane so characteristic of true diphtheria. There may be albumen in the urine in scarlet fever, but it will be only slight in amount, while in diphtheria there is usually one-half or two-thirds.

Such, then, is an outline of the forms of sore throat most common at an age when many of the specific febrile diseases assume their greatest importance. Difficulties in diagnosis are tolerably certain often to occur, not that there is any difficulty in seeing a scarlatinal rash or a membranous exudation on the fauces, or of recognising the importance of careful isolation and uncertain prognosis in such cases ; but the difficulties arise in cases of feverish sore throat in their various forms, when it is not possible to decide on their simple nature or to throw them at once among the specific fevers. It is an interesting question already touched upon that does not admit of a certain answer, In what relation does epidemic tonsillitis stand to scarlet fever or diphtheritic sore throat to diphtheria ; are the poisons alike and yet essentially different, holding a relationship like that of varicella to variola, rötheln to measles, summer diarrhœa to Asiatic cholera ? Are these sore throats in reality the result of infection with "attenuated" scarlatinal or diphtherial poison ? The remarkable results obtained by Pasteur in the cultivation of the organisms concerned in chicken-cholera and splenic fever are extremely suggestive in this direction, and may help to explain how at one time, or in one district, cases are extremely severe, and at another time or place the only effect produced consists in a series of feverish sore throats. Do such attacks of sore throat protect from scarlet fever ? Long continued and collective investigation alone can afford an answer.

# WINTER IN FLORENCE.

BY G. DODS, M.D.

During my yearly visits to England I am frequently asked by medical men and others, what sort of weather we have in Florence in winter? This is a question which I have found some difficulty in answering with any degree of certainty, the winters vary so much one with another. Most people looking back at a winter spent in Florence, have a remembrance probably of some very cold days, some wet ones, and a good many bright and sunny ones. Certainly fine weather predominates, and in a very large proportion of the days the sun shines more or less. With a view to give some reliable information on the subject, I have drawn up the following tables. The figures are taken from records furnished through the kindness of Professor Meucci, Director of the Meteorological Department of the Museum.

TABLE I.

*Average temperature for forty years of the six winter months.*

| | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. |
|---|---|---|---|---|---|---|
| Fahr. . . . | 50 | 43 | 42 | 45 | 49 | 57 |

TABLE II.

*Average temperature for the last six years.*

| | 1877—78. | 1878—79. | 1879—80. | 1880—81. | 1881—82. | 1882—83. |
|---|---|---|---|---|---|---|
| November . . . | — | 49 | 47 | 53 | 50 | 42 |
| December . . . | 43 | 40 | 36 | 46 | 43 | 46 |
| January . . . . | 40 | 44 | 35 | 40 | 42 | 42 |
| February . . . | 45 | 50 | 46 | 45 | 44 | 48 |
| March . . . . | 43 | 51 | 50 | 50 | 54 | 43 |
| April . . . . . | 59 | 54 | 57 | 58 | 56 | 53 |

### TABLE III.

*Number of days on which the sun shone.*

| | 1877—78. | 1878—79. | 1879—80. | 1880—81. | 1881—82. | 1882—83. |
|---|---|---|---|---|---|---|
| November . . . | — | 24 | 23 | 23 | 28 | 20 |
| December . . . | 22 | 19 | 26 | 20 | 24 | 20 |
| January . . . . | 25 | 19 | 25 | 17 | 30 | 23 |
| February . . . | 25 | 20 | 25 | 24 | 28 | 20 |
| March . . . . | 27 | 28 | 27 | 24 | 27 | 25 |
| April . . . . . | 28 | 25 | 25 | 29 | 30 | 28 |

### TABLE IV.

*Showing the number of days on which rain fell, and the total number of hours.*

| | 1877—78. | | 1878—79. | | 1879—80. | | 1880—81. | | 1881—82. | | 1882—83. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Days of rain. | Hours. | Days of rain. | Hours. | Days of rain. | Hours. | Days of rain. | Hours | Days of rain. | Hours. | Days of rain. | Hours |
| November | — | — | 26 | 104 | 11 | 38 | 14 | 77 | 3 | 6 | 15 | 46 |
| December | 14 | 53 | 20 | 60 | 6 | 15 | 12 | 28 | 11 | 36 | 14 | 57 |
| January . | 7 | 26 | 12 | 22 | 4 | 5 | 17 | 101 | 5 | 17 | 9 | 41 |
| February | 3 | 6 | 21 | 83 | 9 | 18 | 5 | 6 | 3 | 10 | 10 | 24 |
| March . | 8 | 24 | 13 | 27 | 7 | 11 | 7 | 31 | 9 | 39 | 16 | 62 |
| April . . | 14 | 48 | 24 | 87 | 16 | 59 | 15 | 3 | 8 | 25 | 11 | 29 |

The cold weather seldom lasts more than three months—December, January, and February—January being the coldest. The weather begins to get warmer towards the end of February, very often about the 20th, but there is always a week of cold weather sometime in March. From January to April it is usually bright and dry, with a great deal of sunshine. If the winter be particularly warm, there is always more rain, as the prevailing wind is then from the west, and brings heat and moisture from the Mediterranean. When the north-east wind blows the weather is dry and cold, and the air clear, but as the sun is bright, this wind, or " tramontana " as it is called, is not disagreeably cold unless there is snow on the mountains. If snow is lying on the hills close to Florence this wind is very trying. Snow sometimes falls in the immediate vicinity, and also in the city, but it rarely lasts twenty-four hours, as it soon melts before the heat of the sun. For the last five years there has been an average of three days of snow. It is frequently frosty during the night. In the winter of 1879-80 the Arno was frozen across. November and December may be called the rainy season. It very seldom rains for many hours in succession, as it does in England, so that there are very few days, if any, in which it is not possible to take out-door exercise.

The streets of Florence being paved with smooth flagstones, are very soon dry after rain. In November of last year, although it rained on fifteen days, yet the total number of hours of rain was only forty-six, or three hours a day (Table IV.). The number of days on which the sun shone are recorded in Table III. During the first four months of last year the sun shone on 115 days, that is to say, there were only five days on which it was completely obscured, and this year it shone on ninety-six days during the same period of the year. In 1879-80 during the whole six months of winter—181 days—there were 148 days with sunshine. This great amount of sunshine, and the dry bracing weather usual in the early part of the year, afford ample opportunities for exercise out of doors.

A favourite walk in Florence during the cold weather is the north bank of the Arno, in the Cascine. The road is completely sheltered from the cold wind by a lofty hedge of evergreen oak, and at the same time being fully exposed to the sun, the air is warm and pleasant, even when there is snow on the ground.

From the foregoing remarks it is evident that Florence is not the climate for persons liable to pulmonary affections, at least not before the 1st of April or after the 1st of November. For those suffering from too close application to business, or fagged with a city life, the climate is well adapted, as it also is for persons debilitated by residence in a hot climate. The number of visitors has increased of late years, and many houses in the city and neighbourhood have been bought by foreigners. There is now a large number of boarding-houses where the charge for living *en pension* is from seven to ten francs a day. The municipality have provided an abundant supply of water of excellent quality, which is used by most of the hotels and pensions.

# ABSTRACT OF A CLINICAL LECTURE ON CERTAIN MODIFICATIONS OF THE OPERATION FOR INTERNAL AND EXTERNAL SQUINT, WITH A SIMPLE METHOD OF TREATING AGGRAVATED CASES OF THE LATTER CONDITION.

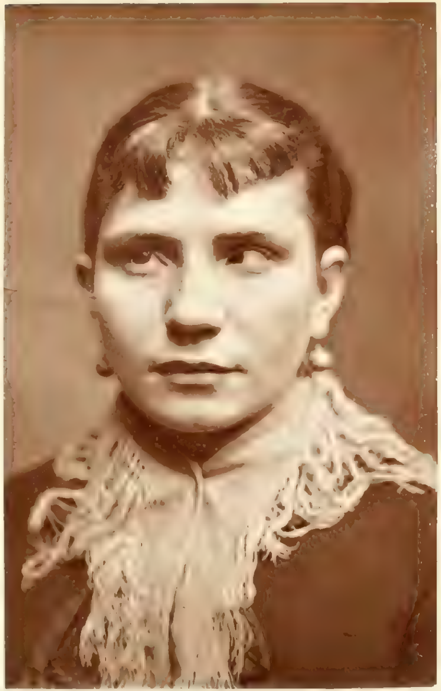
BY CHARLES BELL TAYLOR, M.D., F.R.C.S.E.

*Surgeon to the Nottingham and Midland Eye Infirmary.*

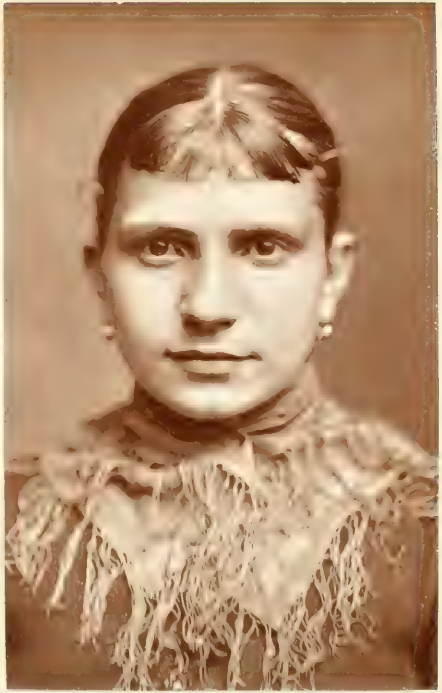
THE operation for convergent strabismus is usually attended with most favourable results, and provided that the tendons only of the internal recti are divided but little after-treatment is required. The method I have adopted in such cases is a modification of the late Von Graefe's operation, whose practice I had an opportunity of witnessing when a student in Berlin. Von Graefe used to make an incision directly over the insertion of the internal rectus, expose the tendon, and divide it on a small hook. This procedure involved either an open wound or a suture, and in order to obviate the inconvenience attending the insertion and subsequent removal of a thread, I have been in the habit of making an incision directly over the lower border of the internal rectus muscle, inserting a small hook beneath the tendon, causing the extremity of the hook to project beyond its upper border and cutting on the point, thus dividing the attachment of the tendon under the small bridge of conjunctiva, which is allowed to remain. In this way we have a small puncture and counter-puncture but no open wound, and the tendon, and the tendon only, is divided as readily as though it had been laid bare. The accompanying photographs before and after operation are average specimens of some thou-

# PLATE I.

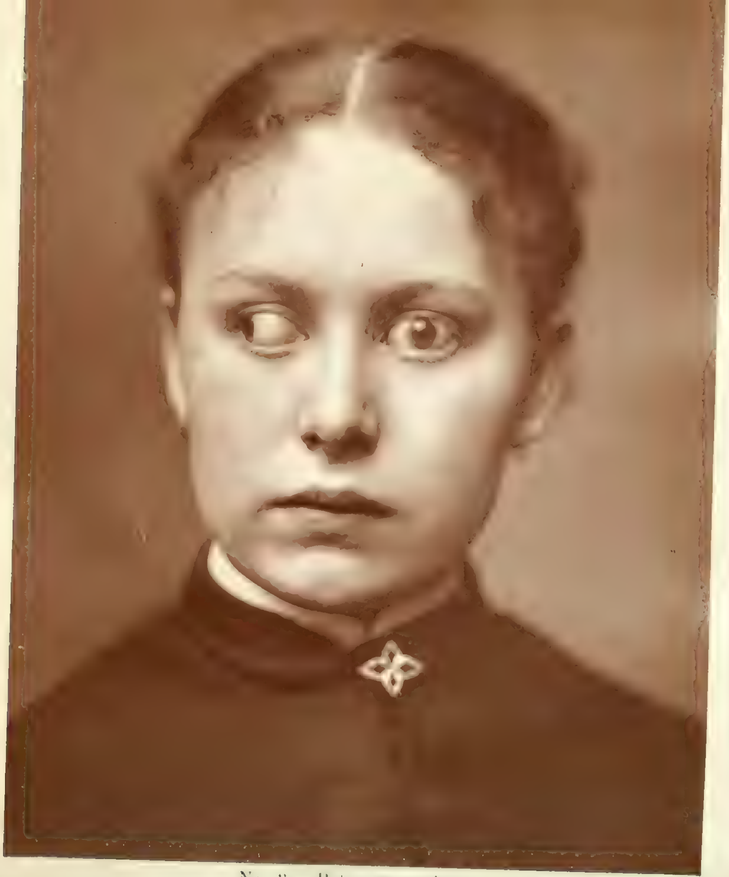
*Convergent Strabismus.*



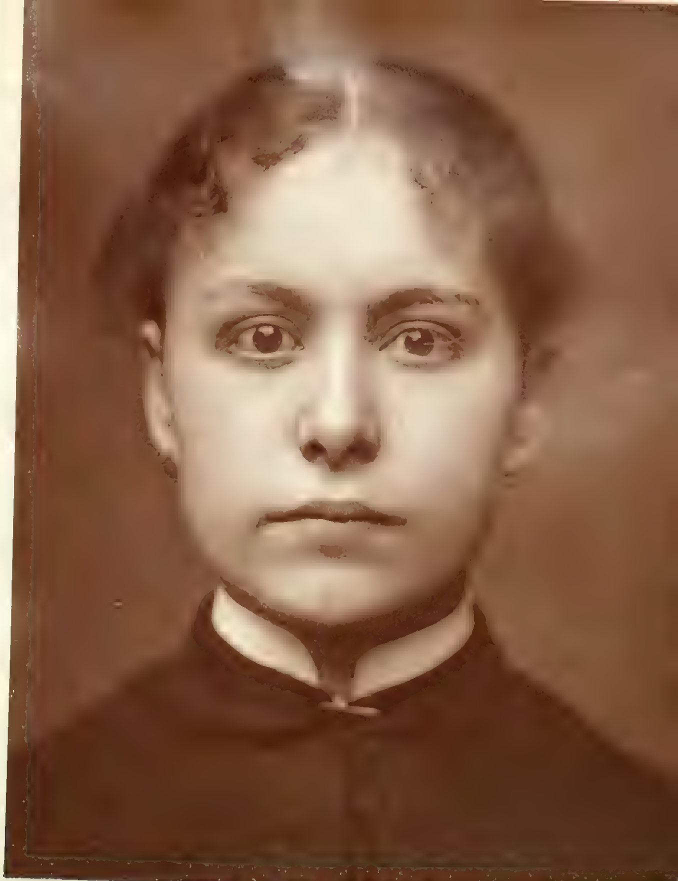
No. 1.—Before operation.



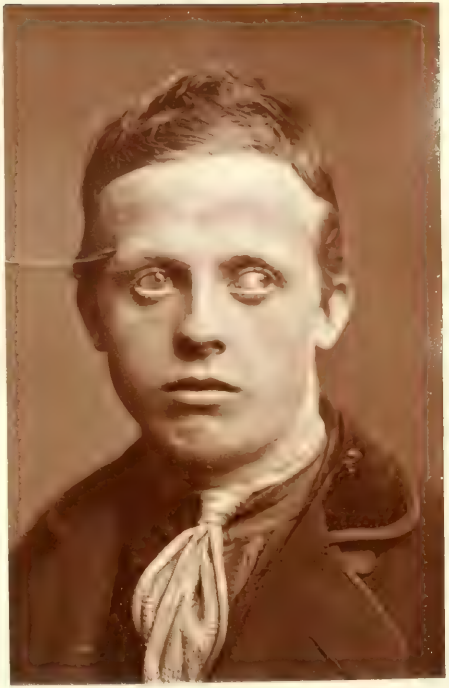
No. 2.—After operation.



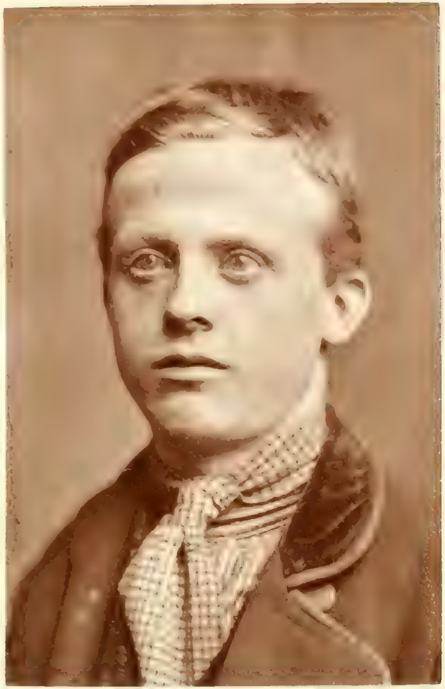
No. 3.—Before operation.



*Congenital External Strabismus*



No. 5.—Before operation.



No. 6.—After operation.

sands of cases on which I have operated in this way since my connexion with the Nottingham and Midland Eye Infirmary (see Plate I.).

Such satisfactory results, however, do not always attend our efforts, and inexperienced operators are apt to leave the patient in a worse condition than before the operation. Here is a case, originally one of internal strabismus, which was operated upon by a surgeon in a distant county some eight years ago. It will be seen in this case that the internal squint had become converted, by injudicious operation, into an aggravated external strabismus. Indeed, the photograph hardly conveys an adequate idea of the extent to which the eyeballs protruded and diverged (see Plate II.). Such cases, whether traumatic, acquired, or congenital, require very careful treatment, and the operations I have devised for their relief vary according to the extent of the deformity.

If the case is slight I divide the external rectus subcutaneously, and insert a suture just over the tendon of the inferior rectus. Having thus secured the control of the eyeball, I turn it inwards and secure it in this position by attaching the suture to the internal canthus. This forced inversion of the eyeball is maintained for some days, and the external rectus, being as it were compelled to attach itself further back on the eyeball, loses its power of abnormally diverting the globe and the deformity is removed.

In medium cases I divide the internal and external recti muscles subcutaneously, and secure inversion as before. In this case the internal rectus is brought forward and the external rectus is thrown back. The advantage of these methods of operating is that there is no open wound, no risk, and very little inconvenience to the patient.

In very marked cases, such as the one depicted in photograph No. 3, I have endeavoured to simplify the ordinary and somewhat formidable operation by merely shortening the internal rectus, leaving the external rectus untouched. This is easily done by catching up the internal rectus tendon on a hook, exposing it, and freely separating its attachment to the sclerotic, seizing the tendon with forceps, and by two horizontal snips converting it into a narrow strip. The base of this strip is then transfixed by a needle armed with a thread, half an inch or more of muscular tissue cut off, and a firm attachment to the sclerotic immediately over the inferior rectus tendon secured by perforation with a needle attached to the other extremity of the thread. The two ends of the ligature are then carefully drawn together, while the eyeball is turned inwards, and any required amount of inversion is thus obtained. The result of this major procedure is shown in the second photograph, No. 4, of the same girl after operation. This method of operating is quite as successful in result as any operation can be. It is scarcely more formidable than the ordinary tenotomy for internal squint. The external rectus is untouched, only one suture is required, no anæsthetic is usually necessary, and the operation is one that admits of rapid execution.

Imperfect operations for external strabismus are apt to be followed by more or less marked return of the deformity. I have not, however, observed many such cases in my practice. Here is a photograph (see Plate III.) of a patient on whom I operated six years ago. I had quite lost sight of him until he called upon me just a week ago, to ask if I would give him a copy of his original likeness, as the men with whom he worked positively refused to believe that he had ever had anything the matter with his eyes.

# A STUDY OF THE THERAPEUTICS OF THE RESPIRATORY SYSTEM.

BY J. MITCHELL BRUCE, M.A., M.D., F.R.C.P., LOND.

(*Continued from* p. 360.)

## III.—Pathological Relations.

The disorders and diseases of this system fall readily into two great classes, according as they affect *the respiratory element* (the red corpuscle) and *its circulation*, or the *nervo-muscular apparatus*, including the lungs and air-passages, the respiratory centre, and the afferent and efferent channels of communication. The former of these two classes does not directly concern us here.

Circulatory, inflammatory, and degenerative changes comprise a large part of the diseases of the respiratory organs, such as bronchitis, pulmonary congestion, hæmoptysis, emphysema, and pleurisy, to which must be added new growths, whilst tuberculosis and syphilis occupy an intermediate position. Whatever their pathological nature, these diseases produce certain well-marked anatomical changes in the parts.

The passages may prove to be obstructed, or actually occluded, by swelling of their mucosa, and by the products of their own walls and of the blood (mucus, pus, blood, *débris*). These products may be arrested, inspissated, possibly decomposed, thus irritating the nerves and vessels. Some of the bronchia may be entirely blocked, with collapse or consolidation of the corresponding lobules, and disturbance of the air-pressure (emphysema) and blood-pressure (hyperæmia) in the parts around. Portions of the lungs may be found either consolidated by pneumonia, or compressed by pleurisy, &c., airless and functionless. Tracts of various size are frequently entirely destroyed by phthisis or gangrene. Hæmorrhage may occur in the alveoli or passages. The right heart frequently proves to be secondarily enlarged, from disturbance of the venous circulation, the viscera congested, and the serous cavities and extremities dropsical. Disease of the respiratory centre and nerves is very rare, but interference with respiration due to injury to the spinal cord is by no means uncommon; the centre may be disordered by certain poisons; and lastly, it is directly disturbed by the temperature of the blood in fever, and possibly by intermittent nutrition in atheroma, &c. (Cheyne-Stokes's respiration).

Whilst many of these anatomical changes are fortunately remediable, others are not so, and the efforts of the practitioner can only be directed to the relief of their symptoms, or, more correctly, their effects. Chief amongst these are cough, expectoration, vomiting, disturbances of respiration, spasm, pain, disorders of the circulation, and excessive perspiration; with somnolence and other disorders of consciousness, and even convulsions, as less common results; and fever, wasting, and derangements of other systems as secondary effects.

*Cough*, which is essentially a physiological act, in itself highly beneficial, may require to be encouraged and strengthened as such. Much more common, however, it is excessive, and becomes one of the most distressing symptoms of disease of the chest; and when it is due to an irremovable mechanical irritant, such as dry hyperæmia and swelling of the mucous membrane, new growths, pressure on nerves, or purely reflex causes in the pleura, abdomen, &c., it will demand speedy relief.

*Expectoration* may also be considered physiological within certain limits, but will require to be modified therapeutically when the quantity of the sputa is either excessive or deficient, or the quality morbid by inspissation, foulness, or other changes.

*Vomiting* is closely associated with cough and expectoration. In some diseases, such as phthisis and chronic alcoholism, the cough, on the one hand, frequently commences in indigestion, or follows closely on a meal, and, on the other hand, almost naturally terminates in sickness. This association is not remarkable when we remember that the two acts and their mechanisms are nearly allied to each other. Vomiting is itself in a great measure an act of forced expiration, attended by cough and evacuation of the contents of the air-passages, as well as of the stomach. The secretions of the respiratory and alimentary tracts are stimulated by much the same causes, such as food and alkalies, the bronchial epithelium undergoing a granular change during gastric digestion, just like the epithelium of the stomach. As a serious cause of inanition, vomiting urgently calls for treatment.

*Disturbances of respiration* chiefly take the form of exaggerated breathing, the acts being increased either in depth, in frequency, in the relative length and force of expiration, or very often in all three respects together. Dyspnœa is a perfectly natural effort to increase oxygenation, and as an expression of stimulation of the respiratory centre, is referable to two distinct classes of causes, the first being central—imperfect oxygenation of the circulating blood; and the second reflex—exaggeration of the impressions reaching it from the air-passages and lungs. Obviously these two sets of causes are usually combined, such anatomical changes as have been mentioned at once interfering with the proper contact of the air and blood in the lungs, and irritating the pulmonary branches of the vagus. As a rule, dyspnœa is successful and highly beneficial, but unfortunately, if it fail to give relief, it tends to aggravate the distress. The increased vigour and frequency of contraction of the muscles of ordinary and extraordinary respiration lead to exhaustion; the rapidity of the movements diminishes the resting-time of the muscular tissue; and the very exertion of dyspnœa consumes the scanty oxygen in the blood. Dyspnœa, whilst in itself a necessary salutary effort, will urgently demand treatment, to remove its cause and strengthen the nervo-muscular tissues; for, if insufficient, it will be a source of great distress, and may lead to rapid exhaustion and even to death.

*Spasmodic dyspnœa,* occurring independently of exertion or obvious anatomical change, is chiefly seen in individuals in whom the nervous mechanism of respiration is highly irritable, and who are said to be asthmatical. The filaments of the vagus originating in the bronchial mucosa appear to be the commonest seat of this hyperæsthesia, exposure to certain aërial particles such as pollen, dust, and particular odours, or the presence in the blood of an excess of uric acid, being sufficient so to impress them as to generate powerful reflex respiratory impulses. These pass out in two different directions—first, to the bronchial muscles, which are spasmodically contracted; and secondly, to the diaphragm, which is thrown into a kind of tetanus. The further effect of both these conditions is urgent spasmodic dyspnœa. In other cases the respiratory centre itself appears to be the seat of special irritability, its extensive connexions with the air-passages, lungs, sensory nerves generally, cerebrum (mind), and blood, exposing it in such subjects to continual risk of inordinate excitement, leading to spasmodic asthma.

*Somnolence, anæsthesia,* and *impairment of consciousness,* occurring towards the end of respiratory or cardiac disease, are the direct result of poisoning by carbonic acid, which is a narcotic. Happily, this narcotism is attended by relaxation of spasm and unconsciousness, and is thus a natural means of relief from distress.

*Pains,* and *sensations* of irritation, tickling, necessity to cough, "want of breath," tightness, oppression, suffocation, &c., originate in impressions conveyed to the sensorium by the vagus; the other portion of the impressions falling into the respiratory centre, as we have just seen, and causing cough and dyspnœa. These respiratory sensations are always exceedingly distressing; and, as they constitute the chief complaints of the patients, they specially demand relief if it can be afforded.

*Disorders of the circulation* are frequent results of respiratory diseases, as they are so often causes of the same. The precise manner in which they arise deserves the careful consideration of the therapeutist. The venæ cavæ within the thorax and the right side of the heart are naturally filled in part by the force of inspiration, which aspirates the blood into them from the systemic veins. When the inspiratory movements are greatly exaggerated in force and frequency, the right side of the heart will manifestly be overfilled or choked, unless the frequency of the beat be correspondingly increased, so as to clear the pulmonary circulation. The very reverse is the case in dyspnœa: venosity of the blood causes slowing of the cardiac rhythm, besides which the pulmonary circulation may be actually obstructed by anatomical changes in the parts. Thus the right side of the heart is always over-distended in dyspnœa, and lung diseases, which occasion dyspnœa, lead to enlargement of the right ventricle. For the same reason the systemic veins are over-filled, the arteries under-filled, the viscera congested and functionally deranged; and the final events are dropsy, with failure of the heart and general nutrition.

The practitioner will do well to appreciate the mechanical origin of secondary disturbance and disease of the heart in lung affections, for, whilst relief from the condition is urgently required, the treatment within his reach is thoroughly rational and efficacious, as we shall see.

*Excessive perspiration* is a common symptom of respiratory disease, venosity of the blood stimulating the sweat centres in the cord and brain. Thus in bronchitis, laryngitis, and cardiac dyspnœa, the skin of the patient is bathed in perspiration; and if the respiration be further depressed, as happens during sleep, the cutaneous secretion becomes even more abundant, and cold sweats occur as the result of diminished evaporation due to weakness of the circulation in the skin. Excessive perspirations are always attended by a sense of prostration, and for this and other reasons are a fitting subject for treatment.

*Ætiology.*—Before the treatment of diseases of this system can be rationally undertaken, the causes, as far as they are known, must be accurately appreciated. The most common cause of disease of the respiratory organs is to be found in the air. The amount, temperature, moisture, purity, and, to a less extent, the pressure of the atmosphere, are the source of a large number of the inflammatory diseases of the larynx, bronchi, and lungs; and it is now believed by many authorities that phthisis, pneumonia, and some forms of bronchitis and asthma are due to the presence of germs which reach the tissues through the air of respiration. Chill gives rise to many nasal, laryngeal, bronchial, and pulmonary affections, especially catarrhs. Diseases of the circulation are also a common cause of respiratory disorder, and even disease. The blood may bring extrinsic or intrinsic poisons to the lungs, and set up such diseases as pneumonia, bronchitis, or pleurisy, for instance, in pyæmia and gout. The nervous system has an unquestionable influence in determining disturbances of respiration, such as asthma, and of influencing diseases of the organs. Muscular exertion or strain may give rise to hæmorrhage, rupture, distension (emphysema), and other affections of the lungs. Lastly, amongst these important causes, constitution, infection, and inheritance must be mentioned, as in cancer, syphilis, and tuberculosis.

The relations and anatomical structure of the lung greatly increase certain of its morbid conditions, prevent their recovery, and aggravate their symptoms. The lung is a great sac, the bulk of which communicates with the air through a long, narrow, vertical passage—an extremely unfavourable arrangement for the removal of inflammatory and infective products, whilst the upper lobes are subject to the opposite danger, of inspissation and retention of its secretions. It is true that the mechanism of cough comes to the aid of the lung; but both cough and inspiration have also the effect of shifting the noxious products from the diseased to the healthy parts of the lungs, and of setting up fresh centres of disease. Lastly, disease or simple obstruction of a tube disturbs the physiological relations of the corresponding lobule, setting up secondary congestion or inflammation within it, and probably emphysema of the parts around. It is important to bear this fact in mind in the treatment of obstructive diseases of the passages, especially in children.

## IV.—NATURAL RECOVERY.

Several great natural provisions for recovery come into operation in the respiratory system, when disease or disorder threatens or actually involves any of its parts; and even if these successively fail in the presence of morbific influences, the control of the latter by the therapeutist in the practice of his art may be sufficient to enable nature to return to the normal. The practitioner must carefully study these natural means of cure, and follow them faithfully as his guide in the selection of remedies. In a single word, they may be called *the employment of regulating mechanisms,* but they deserve more careful analysis.

1. Nature's first method of meeting an extraordinary or so-called morbid influence, by *destroying* or *removing* it, is well seen

in the case of the respiratory system. Coughing and sneezing are provisions for expelling any obstructing or irritating mass from the air-passages; and although apparently but of little service in preventing the most serious kinds of lung disease, they may really expel infective and other causes of morbid change much more frequently than we suspect, just as they guard the nose and the glottis from mechanically irritant particles.

2. The second great natural method of relief which is seen at work in this system is *reaction*, or *counter-action*: the respiratory muscles respond to an obstruction in the passages by such an increase of the force and frequency of their contraction as will negative its action, and after a time they become hypertrophied, if the obstruction persist. Dyspnœa, or (better) hyperpnœa, is the result, a large reserve of muscular force and an almost unlimited power of hypertrophy sufficiently *compensating* for the diminished size of the air-passages and air-current, by increasing the depth and the frequency of breathing. The same principle is at work in the catarrh, that is the hyperæmia and secretion, set up in the air-passages or lungs on the entrance of a foreign body; the mucous, serous, or even purulent discharge—all evidences of different degrees of reaction—being essentially intended to counteract the irritant, as well as to carry it off and repair the damage it may have wrought.

3. The third natural provision against a morbid influence is the *removal of its effects*, whether the influence itself have been removed, or antagonised, or not. Thus excessive secretions or other products of disease, which may in turn cause fresh obstruction of the passages, are removed by cough, expectoration, and vomiting; and the venosity of the blood which they cause is dispelled by hyperpnœa. Even spasm of the bronchi probably never causes death, because removed by the carbonic acid which accumulates in the blood in the second stage of asphyxia. Hæmorrhage from the lungs or nose frequently comes to the relief of over-distended veins and removes the most urgent symytoms.

4. *Vicarious action* is yet another method of natural relief, of which abundant advantage is taken in respiratory disease; extraordinary muscles being called into play in hyperpnœa, the healthy parts of the pulmonary substance taking on increased

function, and the skin and kidneys doubtless becoming more active as excretory organs.

In these several ways nature will frequently afford relief of respiratory disorders and diseases, whilst the cause of them is still at work, by removing or counteracting it and its effects. If they fail, and disease is established, recovery may still follow artificial treatment, the proper province of which is thus to assist, not to compel, much less to thwart nature. Even if organic changes have occurred, recovery may be effected by destructive and constructive repair, as we see in inflammation of the lungs and pleura.

## V.—RATIONAL TREATMENT.

The treatment of respiratory disease must be carried out upon the principles suggested by natural recovery, as above laid down; and to be thoroughly rational must be founded upon the considerations given under the four preceding heads.

(1.) *Removal of the Cause.*—This fundamental method of treatment is more frequently accomplished than might at first appear to be the case. When a patient, suffering, for example, from bronchial catarrh, is put to bed in a warm room filled with moist air, or is sent to winter in a sub-tropical climate, he is probably removed from the morbific influences which originated the disease; and careful attention to his feeding and digestion, and the insurance of mental and bodily rest, will suffice to complete the treatment if urgent symptoms be relieved as they arise, the natural condition of the bronchial mucosa and of the organs disturbed by the disease steadily returning in the course of a few days. Unfortunately, the primary cause of lung disease can but rarely be removed by the natural method of cough, unless it be a foreign body, but secondary disease such as bronchial dilatation from retention, and the spread of phthisis from part to part of the lungs, can doubtless be prevented by the maintenance of free expectoration. Expectorants and emetics will similarly prevent broncho-pneumonia in children by expelling the inspissated products of bronchitis, which threaten to plug the tubes and produce collapse and congestion. A more striking instance of the direct removal of the primary morbific cause is seen in the destruction of the organisms believed to be present in hay-asthma and phthisis, by various disinfectant substances, such as creasote, carbolic acid, quinine, and iodine.

We possess, however, but very few drugs which have a specific effect on the causes of pulmonary disease. Cod-liver oil may possibly be in part directly unfavourable to the development and spread of tubercle ; and syphilitic disease of the lungs is certainly directly antagonised by mercury and iodide of potassium. Aggravating causes are more easily removed; thus cough is frequently relieved by change of posture, and prevented by careful feeding, rest after meals, well-timed stimulation before the patient retires to rest and rises in the morning, and deliberate dressing and undressing. Each of these measures acts upon the cause of the cough, and not directly upon the reflex mechanism.

(2.) *Counter-action of the Cause.*—The phenomena of dyspnœa strongly indicate the necessity of providing, by every possible means, for increased freedom and force of respiration—of assisting hyperpnœa by admitting as much air as possible into the chest. The air must be pure and mild, that is, abundant, fresh, warm, and moist. The muscles of respiration must be free to act upon the chest, and every available muscle of extraordinary respiration must be relieved from other employment and ready to be called into use: the shoulders must be raised, the chest freed from restraint and weight, in front, behind, and especially below in the abdomen, by adopting the sitting posture, and the arms must be capable of being fixed, if necessary. The circulation also must be spared by absolute rest and other measures. And the strength of all these parts will have to be maintained by judicious nourishment and nursing generally. For more chronic cases, systematic exercise of the muscles of the chest will render both the muscles and lungs more capable of counteracting morbid conditions, as they return or become aggravated.

In inflammatory affections of all kinds involving these parts, general and local bleeding and blistering may possibly control the process, but less confidence is now placed on these measures of counter-irritation, or counter-action, than twenty years ago ; and if depressants must be used, general and local depressants of the circulation, such as purgatives, antimony, aconite, veratria, and lobelia are now commonly had recourse to in acute cases. When the lung is compressed by effusions into the pleura, the cause may be directly combated by the valuable method of strapping the affected side or part of the chest which prevents farther flow and promotes absorption; by hastening the natural removal of the fluid by diuretics; or by artificial evacuation by operation. In emphysema the compressed air bath or pneumatic apparatus directly counteracts the inelastic, dilated alveoli; and when spasm is present, many of the antispasmodic measures already enumerated and again to be referred to, act in a manner exactly opposed to the cause.

(3 and 4.) *Removal of Effects: Treatment of Symptoms.*—If the morbid cause can be neither removed nor antagonised, it must continue to act, but its effects may possibly be removed or diminished.

In every case of *dyspnœa* the first points to be attained are absolute rest of all the muscles other than those required for respiration, and as perfect provision as possible for the free play of these, to secure the proper movements of the chest, by the means just described. As a rule, however, the distress which accompanies dyspnœa speedily drives the patient himself to assume the posture most favourable to the free entrance of air. The treatment of the dyspnœa which attends exertion in anæmia, heart disease, phthisis, and emphysema, follows from these considerations: it must be prevented, for it cannot possibly be directly relieved; the amount of movement attempted must be reduced to the level of the respiratory ability, as represented by the amount of blood and air which are brought into mutual contact in a given time.

The products of disease of the lungs and air passages are rationally removed by stimulating the natural provisions for relief, namely *cough* and *expectoration*, which must be judiciously encouraged by the employment of expectorant measures, the end to be secured being rapid clearance of the respiratory passages. The cough must not only be induced and strengthened, but accompanied by a more profuse flow of watery mucus, so as to facilitate discharge of the sputa. Fortunately most expectorants produce the second effects as well as the first; and we are left free to select our remedy, more from a consideration of its concomitant effect upon the circulation, *i.e.* according as a sedative or a stimulant effect is desired. Cardio-vascular sedatives, such as antimony, ipecacuanha, senega, and alkalies, or a combination of these, will be preferred as expectorants in the first stage of inflammatory obstruction of the passages, alkalies being specially valuable as liquefying the mucus; whilst stimulants, such as ammonia, scilla, and the large aromatic group, will be indicated at a later stage when the heart threatens to fail, or at any period in weak subjects. The aromatics, such as camphor, the balsams of benzoin, Tolu, and Peru, ammoniacum, and turpentine, act also as antiseptics, if the products have become purulent and tend to decompose. In every instance the value of warm liquid food must be taken advantage of. Many cases of ineffectual and exhausting cough, from morbid conditions of the passages, are quickly relieved by a meal of broth or warm milk, given say at four or five o'clock in the morning.

*Emetics* may be employed to empty the respiratory passages when blocked by a comparatively large and solid mass, such as a croupous membrane; to empty dilated bronchial tubes when these and the lung-tissue have lost their elasticity from age and debility; and occasionally, when the necessary cough can no longer be induced from extreme weakness, and asphyxia is threatening. In the last-named case much danger attends such a depressing method of treatment; and in every instance comparatively mild and yet certain emetics must be selected for respiratory purposes, such as ipecacuanha and carbonate of ammonia, or sulphate of zinc if these fail.

*Posture* is frequently of value in emptying the bronchi, or cavities communicating with them, of pus and other products. The body may sometimes even be inverted with success.

*Artificial respiration* must be carried out if asphyxia occur.

Whilst provision is thus made for the freer entrance of air, the pulmonary *circulation and heart* must not be forgotten. We have seen that the ventricles—especially the right—become engorged and dilated in threatened asphyxia. The urgent indication here, *quâ* the circulation, is manifestly to reduce the volume of blood in the heart and veins, and to lower the venous tension. The readiest means of doing so is abstraction of blood, and in such a case venesection is of the greatest value, cupping and leeching being less serviceable but still frequently successful. Let the practitioner carefully observe how the relief is obtained: by relieving the *circulation*, not by directly affecting the respiratory centre, for the removal of venous blood (or of blood of any kind) cannot possibly increase the amount of oxygen in the system, except indirectly by relieving the heart and vessels.

Instead of being abstracted, the blood may be in part *diverted* from the thorax into another vascular area, and its volume reduced there by watery excretion. This is accomplished by a free purge, which sometimes affords extraordinary relief at the commencement of acute bronchitis, by filling the abdominal vessels for the time, to the relief of the thoracic viscera, and then draining off a volume of the water by the bowels. Diaphoretics and direct diuretics are valuable under similar circumstances, acting perhaps less strikingly, but more persistently. But instead of reducing the volume of blood, or in addition to this means, we may strengthen the circulation by stimulant measures; and it is here we discover the value of the stimulant expectorants. Thus carbonate of ammonia not only irritates the nerves and glands of the bronchial mucosa, liquefies the secretion, and strengthens the respiratory centre, but is a powerful cardio-vascular stimulant, aiding the ventricular contractions, filling the arteries, and emptying the veins. It and other drugs of the same class are therefore our most valuable medicinal remedies in dyspnœa from bronchial obstruction; and, *per contra*, we must be careful not to push too far the action of the sedative expectorants. Other circulatory stimulants which may not possess expectorant action are so far also indicated in respiratory distress, such as applications of mustard, linseed-meal, &c., to the chest-wall, and warm alcoholic drinks.

In dyspnœa from consolidation of the lung, *i.e.* from *diminished respiratory area*, the plan of treatment must be considerably modified. Here there is neither lack of air nor lack of blood; only they cannot come into mutual contact. The respiratory rate is greatly accelerated and the air thus constantly changed; the cardiac rhythm is also accelerated and the blood thus constantly renewed. The therapeutist appreciates this natural provision, and directs his measures in pneumonia to the support of the powers generally; to maintain the strength of the respiratory muscles, and, most anxiously of all, to sustain the heart, by failure of which death is most likely to occur. Whilst, therefore, the strength is spared in every way, food, alcohol, scilla, ammonia, and digitalis are to be freely given; the atmosphere maintained as pure and fresh as possible; and the accompanying fever, which is attended by cardiac depression, steadily combated by suitable non-depressing measures.

*Dyspnœa with spasm* is so far to be treated in every instance on the same principles as other forms of obstructive dyspnœa, but the spasmodic element must be separately discussed here. By far the most rapid and powerful antispasmodics, practically, are (as stated in Section II.) the *sedative expectorants*, including tobacco, ipecacuanha, &c., which provoke spasm, violent cough, and profuse watery secretion, thus instantly clearing the passages and relaxing the mucous membrane. These remedies, which constitute many of the popular cigarettes and powders for use by inhalation of their smoke, are not, however, to be used in a routine fashion or in other than severe cases, as they lead to further catarrh and spasm, require to be frequently repeated, and beget a vicious "habit," not unlike the alcoholic or opium habit. A milder and equally rational class of antispasmodics to be employed in asthma are the direct depressants of the nervo-muscular structure of the bronchi, the chief of which are atropine (in the form of belladonna), hyoscyamus, or, best of all, stramonium, tobacco, and lobelia, whether in solution or in the form of smoke. Conium is much less useful. Moist warm air or steam may be of great service as the only available remedy. Opium, chloral, cannabis indica, and other narcotics will frequently relieve the spasm, but the objections to the employment of such powerful respiratory depressants in threatening asphyxia hardly need be insisted on. Nitrite of amyl may instantly give relief, but the spasm may as quickly return; nitre fumes suit some cases. Small doses of ether or chloroform in solution are frequently most valuable, because so rapidly diffusible; and a mixture of ammonia, carbonate of ammonia, ether and aromatics, is one of the best combinations for routine practice.

The principal *sedatives* of the afferent or sensory branches of the pneumogastric and the respiratory centre, such as opium and chloral, have just been mentioned with a caution. When employed, morphia may be given subcutaneously or inhaled from smouldering paper. So numerous are the impressions which reach the respiratory centre that there is hardly a limit to the variety of measures, mental as well as bodily in their effect, which may be employed under different circumstances as bronchial and diaphragmatic antispasmodics. Galvanisation of the trunk of the vagus in the neck, and counter-irritation over it by iodine, appear to have given relief in some cases.

We have already referred to *cough* as far as it is to be encouraged and increased for the relief of movable obstruction and dyspnœa: we will now consider the means of preventing or checking it when it is obviously not only useless but harmful, because exhausting, as, for instance, when the irritation is due to simple swelling, morbid growths, or to distant causes connected with pleura, skin, stomach, fauces, &c., or to purely nervous central disturbance, such as hysteria. If the cause cannot be removed, the irritability of the whole nervo-muscular apparatus concerned must be reduced by respiratory sedatives, including warm moist air, warm liquid food, poultices to the chest, acids or demulcents for the fauces, or such drugs as opium, chloroform, ether and chloral, alcohol and conium. Several of these measures may be topically employed by insufflation, inhalation, gargling, or direct application. When given internally, respiratory sedatives are often combined with expectorants which shall remove any movable irritant from the passages. In every case of disease attended by severe protracted cough, the patient should be taught both how to restrain unnecessary cough, and how to employ cough, when essential, with least exertion and to most advantage. When all but powerful opiates have failed to arrest protracted fits of coughing, frequent small meals of warm liquid nutritious food, night as well as day, or pure alcoholic stimulants, may be perfectly successful. Here the food appears to excite a moderate liquid secretion from the bronchi, relieving the dry hyperæmia; and it doubtless also reduces the irritability of the nervous apparatus by increasing the circulation.

The practical use of *expectorant* measures has been already described under the head of dyspnœa. *Anti-expectorant* measures may be demanded when the sputa are excessive, and will consist in a fresh bracing atmosphere, dry simple food, the avoidance of alcohol, and the exhibition of acids, bitters, and probably iron internally.

*Hæmorrhage* from the respiratory organs must be treated on general principles, its cause being carefully considered, especially its relation to the state of the heart. Here it is only necessary to add that rest, which is essential to the arrest of bleeding, must be secured not only by bodily quiet, but by the reduction of the movement of the lungs to a minimum, by strapping the chest locally, and restraining respiration, cough, and conversation; and that cardiac depression, whether naturally induced by the loss of blood, or artificially by antimony and purgation, is an equally important factor in the relief of the few cases which do not spontaneously recover.

*Pain* and the other forms of *distress* in connexion with this system are easily arrested by direct respiratory sedatives, such as opium, but, unfortunately, not without considerable risk. Narcotics are powerful depressants of the respiratory centre, as well as of many other organs, including the heart; and—which is of equal consequence—they interfere with the reflexion which would originate necessary cough and increased breathing, and ultimately aggravate the condition which they temporarily relieve. The greatest discrimination must, therefore, be exercised in having recourse to them, and the routine use of them is to be deprecated. Indirect measures, including the removal of the cause of distress, and external applications to the chest, are alone to be employed if possible.

*Cardiac* and *circulatory* disorders, *sweats*, *nutritive* failure, *fever*, &c., accompanying lung disease—which, after all, constitute a great part of the most urgent indications in chronic cases, such as phthisis—do not concern us in this article, but will certainly demand as much attention as the local condition. The same remarks apply to the various measures which will be called for to preserve or restore the digestive powers, the healthy action of the bowels, kidneys, and skin; the treatment of complications; the use of tonics; and the necessary surgical operations. Some authorities may be inclined to rely more upon these general remedies than on medicinal and other methods of treatment directed to the respiratory organs themselves. The writer believes that the analysis of the normal and pathological conditions, the pharmacodynamics, and the natural means of recovery, which has been attempted in the present article, will not tend to the depreciation of such general measures, but rather the reverse. He has tried to set forth as faithfully as possible what is rationally indicated, and what can or cannot be locally done, simply because this was the subject-matter in hand.

# Reviews.

*Die Lehre vom Harn.* By DR. SALKOWSKI and DR. WILHELM LEUBE. 8vo. pp. 564. Berlin: Hirschwald. 1882.

THIS admirable work is one of the best that has ever appeared on the subject of which it treats, and may be classed along with the works of Neubauer and Vogel, or of Parkes. It is divided into two parts, the first dealing with the chemistry of the urine; and the second with its physiology and pathology. Under the chemistry the authors give a full account of the various substances which the urine contains either in health or disease, along with a description of the methods of ascertaining their presence and quantity. The second part is divided into fourteen chapters, the first six of which deal with the physiology and pathology of the urinary secretion, with the pathological characters of the urine, the pathological relations of the normal urinary constituents, the appearance of abnormal constituents, urinary sediments, and the influence on the urine of general pathological conditions such as fever, alterations in blood-pressure, and dyspepsia. The latter eight chapters treat of the condition of the urine in special diseases of the circulation, of the respiration, of digestion, of the urinary organs, of the nervous system, and of the skin: in constitutional diseases, and infectious diseases. The whole book shows that its writers have a thorough practical acquaintance with the subject they discuss, and we notice among other things that they rightly distinguish between temporary glycosuria and diabetes, although we think they do not give full importance to the condition of gouty glycosuria. This probably arises from the fact that gout being very rare in Germany they have not had the opportunities of observing the condition which are to be had in this country. The book is almost indispensable to any one who is working specially at the subject of which it treats, and we trust that it may soon be translated into English, so that a larger circle of readers may benefit by the valuable information it contains.

*The United States Dispensatory.* By DR. GEO. B. WOOD and DR. FRANKLIN BACHE. Fifteenth edition, revised by H. C. WOOD, M.D., JOSEPH P. REMINGTON, PH.D., and SAMUEL P. SADLER, PH.D., F.C.S. 8vo, pp. 1928. Lippincott and Co.: Philadelphia and London. 1883.

THIS work is divided into two parts of unequal size, the first of which deals with the drugs which are official either in the

United States or in the British Pharmacopœia; and the second part with unofficial drugs. In each part the drugs are arranged in alphabetical order, and their characters, composition, properties and uses, are described. It is a most convenient work for reference, and will be as convenient and as useful in this country as in America.

The present edition sustains the high reputation of former editions; and it is only when we consider the number of alterations and additions which have been made in Materia Medica official and unofficial of late years that the immense amount of labour which must have been bestowed upon the work can be properly appreciated.

We notice here and there omissions or imperfections; thus we find musk marked as only belonging to the United States Pharmacopœia, although under the description we find the musk of the British Pharmacopœia as well. Adonis vernalis is merely said to have the reputation of possessing drastic properties, and no mention is made of its digitalis-like action on the heart (see p. 457 of this number). Sassy bark is merely said to be emetic, narcotic and astringent; its characteristic and very remarkable effect upon the heart and vessels being entirely omitted. We notice also that Hamamelis occurs twice, both in the official and unofficial part, apparently from the description having been placed in the latter part while the drug was still unofficial, and not removed during the process of revision after a similar notice had been placed in the official part. In a work of this size, however, it would be hardly possible that some imperfections should not occur; and after all, on comparing it with other books of a similar character, we cannot but be struck by its general accuracy and completeness. These render it a most valuable cyclopædia on questions of Materia Medica and Therapeutics, and must secure for this edition, as for the preceding ones, an enormous circulation.

*Applied Anatomy of the Nervous System.* By AMBROSE L. RANNEY, A.M., M.D. 8vo, pp. 500. London: H. K. Lewis. 1882.

WE ought to have noticed this book a considerable time ago, for it is one which men studying nervous diseases may often wish to consult. It takes the form of a course of lectures but slightly altered, and the colloquial style makes more readable a subject which is of itself proverbially dry. It is well illustrated with woodcuts, and gives most important clinical hints in connexion with the various parts of the nervous system. Ross's large book on nervous diseases gives all the anatomy that is wanted, but those who possess other works in which the anatomy is not given will find this an exceedingly useful addition to their library.

# Clinic of the Month.

**Perspiration in Albuminuria.**—Dr. Janssen finds that nephritic patients constantly lose large quantities of watery vapour from the skin, but no regularity can be observed in the quantity. Œdematous parts of the body lose more water than non-œdematous parts. Less water is lost by perspiration in acute nephritis, and possibly also in nephritis with contracted kidney. The proportion differs in different individuals suffering from nephritis with enlarged kidneys: they sometimes lose more, and sometimes less, than healthy patients. No regularity could be found in the excretion of carbonic acid by the skin in nephritic patients. (*Deut. Archiv für klin. Med.* p. 334, vol. xxxiii.)

**Lunacy in Town and Country.**—The Commissioners in Lunacy for Scotland, in discussing the relation of pauper lunacy to density of population, show that the distribution of pauper lunacy is similar to that of simple pauperism. A larger proportion of pauper lunatics are annually intimated from the large and principal towns than from small towns and rural districts. On the other hand, when the number of pauper lunatics on the register at any given time is taken, a larger proportion is found to be from small towns and rural districts than from large and principal towns respectively. These phenomena are ascribed to the fact that many persons are sent to lunatic asylums in populous districts who would be treated at home in rural districts, that nervous diseases in general are more prevalent in large towns, and that a larger proportion of cases run a short course in the asylums of populous districts. When qualifications are duly made, it is regarded as probable that about the same proportion of cases such as are sent to asylums in rural localities are sent to asylums in the urban localities, and that they constituted during 1878—82 from 43 to 44 per 100,000 of the population.

The length of residence in asylums of those belonging to the principal towns (having over 20,000 inhabitants) is an average of two years and eight months, to large towns (from 10,000 to 20,000 inhabitants) three years and three months, and of those belonging to small towns and rural districts an average of four years and four months. (*Report of the General Board of Commissioners in Lunacy for Scotland*, 1883.)

**Keeping Hypodermic Syringes in Order.**—In answer to the question how this is to be done, a correspondent of the *New York Medical Record* (Sept. 1, 1883) observes :—" Of course the best way with any and all instruments is to use them. Next to that, *inspect them regularly*, once a month—not only look at them, but look at them with an oiled rag and piece of chamois skin, more carefully in summer than in winter. In considering hypodermic syringes, aspirators, etc., the instruments should be regarded in two parts—the barrels and pistons, which require the *wet* treatment ; and the needles and wire, the trocar and cannula, which require the *dry* treatment. If the piston-leather is old and worn out, it should be renewed ; but if only dried and loose from non-use, draw a little warm water into the syringe, then, placing the finger over its end, slowly press the piston downwards through the water, which will be seen to pass between the piston and sides of the syringe. The water will now be both above and below the piston, and will cause its leather to swell quickly and make a tight joint. In order to keep it so, discharge the water from both ends of the syringe, and treat in the same manner with glycerine, which, being hygroscopic, keeps the piston-leather in good condition. Moreover, pure glycerine will not become rancid, as will oil, etc., nor will it interfere with any chemicals used hypodermically. In the larger syringes a harder fat like mutton-tallow will often cause the piston to work better than oil or glycerine. If the piston should have become so tight that it is impossible to make the glycerine pass above it, invert the syringe in glycerine, or put a few drops around the piston-rod, and then press it slowly downwards. The glycerine will follow into the upper chamber, and will ply back and forward with the piston, and keep it in order. The test for a tight piston is to put the finger over the end of the syringe and quickly pull up the piston-rod, when, if tight, a vacuum will be formed, and the piston return to fill it. The *dry* treatment for the needle consists in blowing out all liquid by several quick strokes of the piston while the needle points upwards, so that no fluid from the syringe enters it. If used but seldom, let this be done in the hot dry air just above the lamp or gas. After removing the needle from the syringe, replace the wire. Should the morphia gradually form a crust upon the inside of the needles, hot water may be drawn through them ; or a quicker and more thorough way is to get a yard of uncut hypodermic wire, fasten down one end, thread the needle upon the other, and then with a few long strokes it is quickly cleansed. When one allows his patient to suffer ten or fifteen minutes' extreme pain while fixing his hypodermic syringe, or, as I have seen, a patient almost loses his life because his physician's stomach-pump will not work, it seems a duty and but little trouble to *inspect* for a few minutes, the first day of each month, those instruments which ought to be kept in order." (*Med. Times.*)

**Lymphorrhœa from the Nose in Leucocythæmia.**—Dr. Cornil relates the case of a patient suffering from leucocythæmia who had a discharge from the nose of a thick, transparent, glairy fluid. It flowed slowly but constantly, and was neither thin like the discharge of a commencing coryza nor opaque like that of a more advanced nasal catarrh, but contained a large quantity of white corpuscles. The patient did not sneeze, nor were there any tickling sensations in the nose. At the autopsy the mucous membrane of the nasal fossæ was seen to be smooth, without ulceration, but thickened in places. The thickened parts presented a grey colour on section. They were formed by an infiltration of the connective tissue with a mucous transparent fluid, like lymph. It was this leukæmic infiltration of the Schneiderian mucous membrane which was the cause of the nasal lymphorrhœa. (*Revue Médicale*, Aug. 11, 1883.)

**Hydriodate of Hyoscin in Phthisis.**—Dr. Fraentzel recommends hydriodate of hyoscin in the treatment of the night-sweating of phthisis, in subcutaneous doses of half a milligramme ($\frac{1}{120}$ gr.), or in pill, beginning with the same dose. He does not find it so universally beneficial as atropia, and it sooner exhibits a narcotic action; but he has seen good results from it in cases where atropia has proved useless, or has failed to act after being in use for some time (*Wiener med. Blätter*, July 5, 1883.)

**Hereditary Ataxia.**—L. Rütimeyer reports several cases resembling Friedreich's hereditary ataxia. Eight were in one family, and three in another. It appears sometimes as early as the fourth year, sometimes as late as the eighteenth year. The disease is quite different from progressive locomotor ataxia; there is not the lancinating pain; the ataxic gait appears early, and soon there is incoördination of the upper extremities; the speech shows disturbance of coördination, and there is ataxic nystagmus; tendon reflex is absent; there is often a slight diminution of sensibility; muscular sense is not disturbed; at length there is paraplegia with contracture; bed-sores rarely form; there is no disturbance of bladder; the mind is not affected.

Rütimeyer thinks the disease affects the spinal cord primarily, the medulla oblongata and corpora quadrigemina secondarily. Dr. William A. Hammond has also suggested (*Journ. of Nervous and Mental Diseases*, July 1882) that the medulla oblongata may be the seat of the lesion in this affection. (*Virchow's Archiv*, vol. 91, 1882.)

**Eucalyptus in Gangrene of the Lungs.**—Dr. Bonamy relates the case of a man, about fifty years of age, who was admitted to hospital suffering from cough, dyspnœa, and fever. A few days after admission the fœtid odour of his breath became so extreme that it was necessary to separate him from the other patients. There was dulness in the axillary line on the left side over the middle portion of the lung. At this point there was tubular respiration, and crepitant râles were audible at the end of inspiration. The sputa consisted of a black matter, detached portions of which were swimming in an abundant serous fluid. The cough was incessant, and the odour intolerable. A diagnosis was made of gangrene of the lung of superficial extent. The patient was first put upon a mixture containing carbolic acid, but no improvement following, this was replaced by tincture of eucalyptus. In two days after the last prescription the odour of the breath was much less offensive, and in less than two weeks the patient was cured. (*Le Courrier Médical*, Aug. 18, 1883.)

**Symmetrical Gangrene and Intermittent Hæmaturia.**—Dr. Southey has reported the following case to the Clinical Society of London. F. N., aged nine (admitted into the Matthew Ward, St. Bartholomew's Hospital, November 25, 1881), was much emaciated, his hair thin and falling off, his abdomen empty and retracted, skin dry; and he was in a curious, excitable, semi-delirious mental state. He presented a gangrene of the tip of his right index finger; all his extremities felt cold, and he had insomnia. His pulse was 148, very feeble. Respiration 32. Temperature 99°. His heart beat with feeble impulse, in the normal situation. There was no increase of normal cardiac dulness; no cardiac murmur; no physical signs of lung-disease. Neither liver nor spleen transcended its normal limits. His appetite was bad; he had had no sickness; the bowels acted once daily; the tongue was clean and moist; micturition gave no pain; the urine was scanty, not abnormal, chiefly passed with his stools. After a few days the thumb and second finger of the same (right) hand were similarly involved; they first became red and throbbed, then livid, and finally gangrenous. On December 5 exactly similar spots occurred on the pinna of the right ear, and on the extremity of his nose, and on the tip of the middle finger of his right hand. A little later subcutaneous mottlings (tachetés) appeared all over his trunk and limbs, and developed into a raised rash, like urticaria tuberosa, or erythema tuberculatum. The spots first itched, then became painful and tender, but gradually subsided, leaving only some pigmentation to mark their sites. Finally, all the fingers and the thumb of the right hand became gangrenous and slowly separated; also the thumb, index, and little finger of the left hand. He passed into a condition of most extreme prostration, with broncho-pneumonia of both lungs, and only very slowly and gradually recovered from it. In January 1882, a new and interesting clinical feature was manifested, namely, intermittent true hæmaturia, bloody urine being passed alternately with normal-coloured non-albuminous urine. On some days, distinct blood-cells were passed with the urine; on others, blood-colouring-matter without blood-cells; on others, albumen with blood enough to give the blood-reaction only. Oxalate crystals were present in great abundance when the hæmaturia was abundant, and *vice versâ*. No tube-casts were ever noticed. All symptoms of urinary disorder disappeared in July 1882, when the child was discharged well, but with the loss of his fingers. He had been seen several times since. Dr. Barlow said he had never seen so severe a case of the disease as that described by Dr. Southey, but he had seen two or three which were less severe. As Dr. Southey had observed, the most important feature they presented was not the gangrene, but the vaso-motor disturbances. In one case, within his own experience—that of a man aged thirty-five, who had been generally regarded as rheumatic—the attacks, which usually occurred in winter, were ushered in by pain in the lower extremities, which was followed by the appearance of bluish-red patches on the integuments. When first seen by Dr. Barlow, he had just suffered an attack, and there was a distinct patch on one trochanter, while one toe was the subject of local gangrene, and all his toes were blue. In two other cases observed, in female children, three and a half years old, the attacks occurred between September and April, being rare in summer, and were in the latter case associated with sudden changes in temperature. In one child, the lower limb affected was, when seen, intensely painful and black from above the ankle to the toes, and presented a most alarming appearance. It remained thus for about three hours and then passed off, the child seeming quite well again. She had several attacks of the kind in the legs and fore-arms. The attacks occurred on cold days in the other case also, and on several occasions were accompanied with violent stomach-ache, while, two or three hours subsequently, dark-coloured urine, containing hæmatin, oxalate crystals, and albumen, would be passed, but only once after each attack. Dr.

Barlow considered that the disease presented many points in common with that known as paroxysmal hæmaturia. It was a disease of winter, and was usually preceded by a condition of sleepiness; its resemblance to ague-attacks was not well marked, for there was no sweating stage observable, the cold stage being the principal one. He had elicited from the mother of the patient presenting typical paroxysmal hæmaturia, that the child's finger-ends grew distinctly blue during the attack, and so familiar was the appearance, that no special heed was paid to it. Dr. Barlow thought that the application of cold was a more rational treatment than the employment of warmth, being led to this opinion from his knowledge of the effects produced by cold in the treatment of frost-bites. He mentioned the case of a child, which—a sufferer from paroxysmal hæmaturia, and accustomed to be washed in warm water—was submitted to the influence of cold water, with good results. The constant current applied down the back had been employed by Reynaud, with a view to diminish the irritability of the vaso-motor centres, and with success. A patient of his own had described how this treatment was the only one which had done him much good while in St. Bartholomew's Hospital, and the method was certainly worthy of extended trial. There was no confirmation forthcoming of the association of rheumatic gout with the disease in his cases. Mr. Hutchinson, however, had described a connexion between ordinary arthritis and Reynaud's disease; and a patient under his (Dr. Barlow's) care might be taken to confirm this opinion. Dr. Mahomed had seen two cases similar to that mentioned by Dr. Southey. In one, intermittent hæmaturia had existed, and crystals of oxalates were found in the urine. He explained that this frequent association of intermittent hæmaturia with symmetrical gangrene effectually separated such cases from those dwelt on by Mr. Cripps; and, moreover, the patients in the former cases were not necessarily endowed with a feeble circulatory apparatus. A few male patients of his own had suffered from the disease in a more or less chronic form for seven or eight years. The fingers presented a gangrenous appearance, which varied with the weather, but was not improved by treatment. The tips of two or three fingers had been quite lost. In summer time, the hand was quite useful. (*Lond. Med. Record*, October 1883.)

**Hysterical Pseudo-Phthisis.**—In young women suffering from chlorosis and hysteria there is often, according to Dr. Fabre, a condition simulating phthisis. There is a cough, with expectoration, and even spitting of blood. Physical examination reveals dulness at the apex (usually on the right side), feeble respiration, and occasional râles. The author regards these symptoms as due to a vaso-motor disturbance exciting a pulmonary congestion. Other organs may also be subject to functional disturbances. Obstinate anorexia, gastric pain, occasionally diarrhœa, but more frequently constipation, are not seldom present. The pulse is weak and frequent, like that of fever, although the temperature may be normal. Sometimes, however, there is elevated temperature, but it is only transitory, and regular evening exacerbations are never observed. The expectoration is not purulent, but may be mixed with blood. While in true phthisis there is emaciation, in these cases the patients often increase in weight. Sweating, as a rule, is not met with. The differential diagnosis is often difficult, and the author relates that cases have not infrequently occurred in which a diagnosis of pulmonary consumption was made, but the patient nevertheless recovered. The condition may exist without material improvement for months, or even years. (*Centralblatt für Gynäkologie*, Sept. 8, 1883.)

**Bromide of Ethyl and Nitro-glycerin.**—Professor O. Berger has found bromide of ethyl useful, (1) In neuralgic conditions of the nerves of the face and head, in megrim, and in nervous headache and heaviness. The inhalation of twenty to forty drops of the remedy several times a day has lessened headache in cases where quinine, salicylic acid, caffein, and guarana had all proved useless; and in three cases of headache connected with cirrhosis of the kidney it was better than any other remedy. (2) In neurasthenia: it is here given in doses of from one to three grammes twice or thrice a day if necessary. (3) In epilepsy: here it is of very little use, although Bourneville and D'Ollier considered it useful. They narcotised their patients daily for ten to twenty minutes with it, but when given in doses of one gramme daily by inhalation it is useless. It is besides expensive, and causes much depression. When inhaled before or during the epileptic attack it only prevents or cuts it short in exceptional cases. (4) In hysteria it is of more use. The attack of hystero-epilepsy may sometimes be cut short by narcotising with it for ten or fifteen minutes, eight to twelve grammes of the drug being required. When given in doses of a half gramme to two grammes by inhalation once or twice a day, it may avert a threatened attack of hystero-epilepsy. (5) In several cases of psychical excitation the bromide of ethyl has proved serviceable. The author finds nitro-glycerin also useful in headache. (*Breslauer ärztl. Zeitschrift*, No. 8, 1883.)

**Peritoneal Transfusion in Pernicious Anæmia.**—Ponfick first published (*Berl. klin. Woch.* Sept. 1879) the results of three cases of pernicious anæmia in which peritoneal transfusion of blood had proved of some value. Bizzozero and

Golgi afterwards showed that the patient's blood was enriched in hæmoglobin by the transfusion. Foà and Pellacapi traced the path of the coloured corpuscles into the blood-vessels by way of the lymphatics of the abdominal glands and diaphragm. A collection of cases made by Professor Burresi shows thirty-eight published instances of the operation, of which twenty-seven were made in Italy. There were seven in which it did distinct harm, twenty-four in which it was judged to have done more or less good, and seven in which it did neither good nor harm. As an instance of one of this last class of neutral cases, Professor Burresi relates one in his own practice. A man of forty-two was in an advanced state of pernicious anæmia, the coloured corpuscles only numbering 868,000 in the cubic millimetre, the colourless about 0·5 per cent. Two students supplied about 8 oz. of blood each, which was defibrinated, filtered, warmed to about 102°, and very slowly injected into the peritoneum by a cannula just below the umbilicus, the operation lasting about twenty minutes. There was feverishness, which lasted for a day, no definite improvement, and the man died exhausted six days after the operation, the number of coloured corpuscles in the cubic millimetre having fallen to about 700,000. The post-mortem examination showed many coloured corpuscles in the abdominal lymphatics, an excess of fibrous tissue in the spleen constricting the arteries, the medulla of the bones normal microscopically, and slight peritonitis. Professor Burresi considered the death was not due to the transitory peritonitis, but to the chronic and persistent failure of the hæmatopoietic organs. (*Lo Sperimentale*, July 1883.)

**Hypodermic Transfusion of Blood.**—Dr. Paladini relates the following case in the *Gazzetta Med. Italiana-Lombardia* for August 25 :—A woman, forty-eight years of age, had suffered for a long time from menorrhagia, which had reduced her to a condition of extreme anæmia. When seen by Dr. Paladini at the beginning of August she had frequent faintings, though kept in the horizontal position, was unable to take food of any kind, and, in his opinion, transfusion was urgently called for on account of her very exhausted state. As the patient lived in a remote village, where appropriate instruments could not be obtained, he resolved to perform hypodermic injection by means of a syringe having a capacity of about ninety cubic centimetres, and a gum-elastic tube, to which a trocar and cannula were attached. He selected the skin of the abdomen, because this was lax enough to be raised in large folds and to receive a considerable quantity of blood. The woman's husband having furnished about two hundred grammes of blood, two syringefuls were successfully injected into the subcutaneous tissue, at four fingers' breadth to the left of the umbilicus, care having been taken to force the trocar far enough in to insure a sufficient space for the reception of the blood. When the blood had been injected, a salient projection about the size of an egg could be felt there. It was calculated that at least 130 grammes of blood had been injected. No pain or other inconvenience was caused by the operation, and in about two hours the tumefaction had disappeared. The next day the uterine flow, which had continued, in some measure decreased, and the patient was able to take food and enjoy some sleep. The report comes down to a fortnight afterwards, when the patient was found to be slowly recovering her strength, but only just able to leave her bed, so great had been her previous exhaustion. The marked success which attended the hypodermic injection in this case leads Dr. Paladini to hope that so easy and innocuous a mode of performing transfusion will be hereafter frequently resorted to. If necessary, from 120 to 300 or 400 grammes of blood may thus be promptly injected by means of one, two, or three punctures. (*Med. Times and Gaz.* Oct. 20, 1883.)

**Variation and Disappearance of Cardiac Murmurs.** —Dr. E. Hyla Greves writes concerning the variations and changes so often observed in certain cardiac murmurs, dependent on definite organic lesions. He relates the histories of several cases, from a study of which he draws the following conclusions: (1) Although murmurs are among the most constant of the physical signs of heart-disease, still their presence does not necessarily indicate the existence of incurable lesions, nor their absence that such lesions are not present. In forming a correct diagnosis and prognosis of any case, therefore, too much reliance must not be placed upon the presence or absence of murmurs, but other symptoms must receive careful consideration, for often on them alone is it possible to form a correct diagnosis. (2) The præsystolic murmur of mitral stenosis, the most typical of all murmurs, occasionally disappears, the lesion still remaining. Mitral regurgitant murmurs, when due to simple relaxation of the heart's muscle and dilatation of its cavities and orifices, as in chlorosis and general febrile conditions, in most cases completely disappear under appropriate treatment. (3) Tricuspid regurgitation is occasionally a temporary condition, due to bronchitis, &c., and when the cause is removed this condition is recovered from, as is indicated by the disappearance of the murmurs. (4) Aortic systolic murmurs, due to a permanent lesion at the aortic orifice, may undergo changes in their intensity, but never completely disappear. (5) Aortic diastolic murmurs in certain extremely rare cases have been known to disappear. In these cases a systolic aortic bruit is always present and remains persistent, thus indicating the existence of the lesion. (6) Pulmonary systolic murmurs are persistent when due to an organic lesion; but if non-organic, may disappear temporarily or permanently. (*Liverpool Medico-chirurgical Journal*, July 1883.)

**Salicylate of Sodium in Phlegmasia Alba Dolens.**—M. Vigar states that he has attended four cases of this affection. In the first he used no internal remedies, limiting himself to the local measures advised by various authors, keeping the patient in bed two months, and even then a certain degree of œdema remained, with a few nodosities on the course of the inflamed veins; these disappeared very slowly, and at the end of five months slight traces of them were still discoverable. In his other three cases he used the salicylate of sodium, with very good results. He gave it to the extent of one drachm per day, and after the first day found that the temperature fell very decidedly, the pulse became slower, and the œdema diminished to a very notable extent; the disease passed through its phases of inflammation and repair in so short a time that not one of the three patients was confined to bed longer than the third week. No signs of œdema or of nodosities on the limb remained. (*Glasgow Medical Journal*, Sept. 1883.)

# Extracts from British and Foreign Journals.

**Itching as a Symptom of Bright's Disease.**—During the course of Bright's disease itching is often experienced unconnected with any cutaneous eruption, and sometimes invading every portion of the integument. This symptom may be described as occurring in three different forms: 1st, as itching, properly so-called; 2nd, as horripilation; 3rd, as formication. These sensations are a frequent accompaniment of Bright's disease; they are complained of at various periods; they may be felt both at the outset and during the course of the confirmed malady. When met with at the commencement, they rank as an important symptom and one of great semeiological value; they coincide, at this period, with the pollakuria, the cramps, the palpitations, the disorders of hearing, the epistaxis, etc., and may precede the appearance of œdema and albuminuria, thus serving, without any other aid, to place the physician on the right diagnostic track. Coming on at a later period, they merely constitute an additional and conjoint symptom of the disease. The pathology of this phenomenon is as yet based upon hypothesis. It represents a disorder of the sensory sphere, due, probably, to the irritation produced at the terminal extremities of the nerves by refuse material retained in the blood through failure in the eliminative functions of the kidneys. (*Journ. of Cutan. and Vener. Diseases,* July 1883.)

**Action of Chloral and Chloroform on the Skin.**—From his experiments L. Schulz comes to the following conclusions. The application of chloroform to the skin of rabbits produces no characteristic reflex action; sometimes the symptoms of absorption occur. The application of chloral free from water to the skin is always followed in a short time by the symptoms of the general action of hydrate of chloral. That the chloral has been absorbed and changed into chloral hydrate is proved by the presence of urochloralic acid in the urine. Solutions of hydrate of chloral rubbed into the skin of dogs have no action. When the skin is cauterised with strong acid no reflex is observed from the central nervous system. The blood-pressure remains unaltered after the application of chloroform, chloral, or of concentrated acids to the skin. When chloral or formic acid is rubbed into the skin, hæmoglobinuria and nephritis sometimes occur. (*Archiv für exper. Path. und Pharm.* p. 305, vol. xvi.)

**New Alkaloid in Cannabis Indica.**—From an investigation commenced at the suggestion of Professor Schmiedeberg, Dr. Matthew Hay has come to the conclusion that cannabis indica contains several alkaloids; one of those which he has separated possesses an action similar to that of strychnia. It is evidently quite a secondary alkaloid of the cannabis, and reminds one of the thebaine of opium. To this alkaloid he proposes to give the name of tetano-cannabine as indicative of its action. (*Pharmaceutical Journ.*, June 2, 1883.)

**Effect of Cooling on Respiration.**—The results obtained by Dr. Speck from experiments on this subject are that a cold bath, besides causing a marked diminution of the temperature, produced a moderate increase in the respiratory rate with corresponding alteration in the absorption of oxygen and excretion of carbonic acid, and a very slight increase in the activity of the oxidation processes in the body. The latter increase occurs about twenty minutes after the bath, and then is succeeded by a slight diminution. The respiratory rate, which is increased during the bath, becomes after it normal, or sinks under the normal and rises again twenty minutes after the bath, and then remains increased for a long time, the respirations being deeper than usual. The author did not observe the marked increase of the oxidation processes which most others have noticed. (*D. ut. Arch. für klin. Med.* p. 375, vol. xxxiii.)

**Circulation in the Kidneys.**—Cohnheim and Roy have made a number of observations on the circulation in the kidneys by means of Roy's oncograph, which consists of a metal capsule lined with delicate membrane, the space between the metal and the membrane being filled with oil. The oil communicates by means of a tube with a recording apparatus, and the kidney being enclosed within the membrane, any alterations in its volume are recorded automatically. The vessels and nerves pass freely through a proper aperture. They find that usually the amount of blood circulating in the kidney, as shown by the increase and diminution in its volume, rises and falls in perfect parallelism with the curve of general blood-pressure, and like it exhibits large respiratory elevations and smaller elevations corresponding to the pulse. Partial suffocation causes, as is well known, a great rise in the blood-pressure, but in place of increasing it diminishes the volume of the kidney, showing that the vessels of the organ have become much contracted. The contraction is due to stimulation of the nerve-centres, which stimulation is conveyed to the kidneys through the vascular nerves. When all the nerves passing to the kidney are divided at the hilum, the volume of the kidney increases as the blood-pressure rises during suffocation. This is not the case if one or both splanchnics only are divided, which shows that the splanchnics do not contain all the vaso-motor nerves of the kidney. Irritation of sensory nerves such as the sciatic causes rapid rise of blood-pressure with diminished volume of the kidney, and this lasts a considerable time after the irritation has ceased. Poisoning with strychnia also causes a rapid rise of blood-pressure, and a great diminution in the volume of the kidney, so long as the renal nerves are not destroyed. Irritation of the central end of the divided splanchnic causes much contraction of the renal vessels in both kidneys: the effect is just the same as that of irritation of the sciatic or any other sensory nerve; but irritation of the peripheral end of the splanchnic has a similar action, causing great diminution in the size of the kidney on the same side at least, and great rise in blood-pressure. The kidney on the other side is not so certainly affected by irritation of the peripheral end of the splanchnic: sometimes it contracts, but sometimes it increases in size along with the rise in blood-pressure. Neither irritation of the splanchnics nor of the nerves of the kidney as they enter the hilum give any evidence of vaso-dilating nerves: irritation of both was constantly followed by diminution in the size of the kidney. The circulation in the two kidneys goes on independently, and closure of the renal artery on one side by a clamp has not the slightest influence on the circulation in the other kidney. The application of ice-cold water to the skin had, contrary to expectation, very little or no action at all on the circulation in the kidneys. (*Virchow's Archiv*, vol. 93, June 1883.)

**Stewed Fruit for the Gouty and Dyspeptic.**—Dr. Milner Fothergill recommends the use of stewed fruits in many instances of gout and dyspepsia. Sugar is undoubtedly objectionable to many, but it is by no means necessary to add sugar to stewed fruit; if the acidity be neutralised by an alkali, little or no sugar is required. Thrifty housewives have long been familiar with the fact, that the addition of a small quantity of the bicarbonate of soda to stewed fruit reduces the acidity, so as to save the necessity for much sugar. If about as much bicarbonate of potash as will lie on a shilling be added to each pound of fruit, it will be found sufficient to neutralise the acidity, and to bring out the natural sweetness. Milk puddings and stewed fruit are excellent for the dyspeptic, the bilious, and the gouty. (*Lancet*, July 7, 1883.)

**Action of Manganese and Iron.**—This subject has been investigated by Kobert. Three milligrammes of the citrate of manganese and sodium are sufficient to kill a frog, and one milligramme usually produces symptoms of poisoning. The action is rapid, much more so than that of iron or tin, and the lethal dose is much smaller than that of cobalt, iron, nickel, or tin. The reverse ought to be the case if Blake's idea were correct that the lethal activity of metals belonging to the same group increases with their molecular weight. The symptoms produced by a small dose (·8 milligramme) consist in paralysis of voluntary motion, while respiration, reflex action, and the circulation remain intact. When the dose is larger the reflexes become slower and the heart weaker. With a still larger dose the heart is arrested in diastole; the reflexes disappear somewhat later, and the irritability of the nerves and muscles both directly and through the spinal cord last for hours. If the quantity of the poison is only just large enough to kill, the voluntary paralysis and slowness of the reflexes are followed by abolition of reflex movements, and only after this does the heart become gradually weaker and stop in diastole. The early arrest of the heart distinguishes poisoning by manganese from poisoning by iron, nickel, and cobalt, where the heart is the last to be affected, and renders the action of manganese more similar to that of antimony. The paralysis, like that produced by iron, affects the excito-motor ganglia of the heart, so that atropia does not remove the diastolic arrest, while mechanical irritation produces distinct or at least partial contractions of the ventricle, and helleborin causes first several more or less powerful beats and then a standstill in systole. Camphor and physostigmin, when applied before the heart has been completely arrested, have transient accelerating action, but do not appear to prevent the final diastolic standstill. The statement of Richet that manganese causes arrest in hemi-systole is incorrect. Symptoms of irritation are never observed in frogs when the solution applied is of a proper concentration. Vomiting and fibrillary twitchings of the muscles are also absent, although such twitchings are almost constantly present if the solutions contain too much citric acid. The cessation of reflex action shows that the transverse conduction in the spinal cord is weakened or destroyed; the longitudinal conduction is usually perfectly intact even after death. Neither the peripheral motor nerves nor the muscular substance are affected. Dogs are most sensitive to the poisonous action of manganese, which is for them five times as poisonous as iron. If manganese were as poisonous for man as for dogs $\frac{1}{2}$ gramme of oxide of manganese would be a lethal dose for an adult. No local symptoms are produced, and death would occur in a similar manner if the quantity were not injected subcutaneously all at once, but only at several times during twenty-four hours.

These facts might render manganese a dangerous poison for criminal purposes, and they must be borne in mind also in regard to the possible use of permanganate of potassium injected subcutaneously as an antidote for snake poison. Cats and rabbits are also sensitive to manganese, guinea-pigs are much less so. The general action of manganese upon cats and dogs is different from its action on rabbits and guinea-pigs. These latter animals cannot vomit, and the symptoms produced by a large dose were violent epileptic convulsions with death in a few moments, or at most in one or two hours. A small dose caused want of appetite, languor, dragging of the legs, a fall of temperature, diminution of reflex action, and finally motor and sensory paralysis with gradual cessation of respiration and death. Diarrhœa continued to the last and the heart, although weak, continued to pulsate after the respiration stopped. Convulsions in these cases seldom appeared, and were only transient. In cats and dogs nausea and vomiting occurred soon after the administration, and continued until death. The vomited matter was often colourless, but also often tinged with bile. When the dose was too small to produce death, these symptoms sometimes lasted for three days, during which all food was vomited, but water taken greedily. The urine was abundant, of low specific gravity, and containing extraordinarily little urea. After a little the urine became bilious, and, when the dose was fatal, albumen occurred in the urine. The occurrence of jaundice in acute poisoning by manganese the authors think to be peculiar to this metal, and to separate poisoning by it from other cases of metallic poisoning, while at the same time it allies its action to that of phosphorus. They did not notice, however, any bile in the urine of guinea-pigs or rabbits, and it is to be remembered that biliary colouring matter may occur in the urine of perfectly healthy dogs. Besides these symptoms affecting the intestinal canal in dogs, there was great depression, diminution both of motor and sensory power, and drowsiness, which gradually passed into complete loss of reflex action and death. Convulsions never occurred in dogs when the poison was injected subcutaneously, but if it was injected into the blood directly rapid death accompanied by convulsions was produced. Manganese appears to have no action on the gases of the blood, and unlike phosphorus or arsenic it does not cause the glycogen of the liver to disappear. It paralyses the vaso-motor centre, first temporarily and then permanently in warm-blooded animals. The heart is affected much later but is also paralysed. This paralysis appears to affect the motor ganglia of the heart and not of its muscular substance. The vaso-motor nerves do not appear to be paralysed, as irritation of the spinal cord and cervical region produced a rise of blood-pressure even after the poisoning was far advanced. The course of the symptoms produced by injection of a large dose into the blood of warm-blooded animals is first irritation of the brain, then convulsions, then paralysis, beginning with stoppage of the respiration and ending with paralysis of the vaso-motor centre, then apparent irritation of the heart (rapid action of the heart like that due to chloral), and finally paralysis of the cardiac ganglia. The skeletal muscles were irritable, for several minutes after death. On comparing its action on warm-blooded animals and on frogs, it is seen that paralysis of the cardiac centres occurs soon in cold-blooded and late in warm-blooded animals; convulsions never occur in frogs, while they form the rule in rabbits and dogs when the poison is injected into the blood. The paralysis of voluntary movement and diminution of the reflex irritability with which the poisoning begins in frogs, is observed only after small doses are injected subcutaneously in warm-blooded animals. Vomiting was never observed in frogs. Experiments on chronic poisoning by manganese showed that it is not absorbed from the stomach or intestine. When injected in small quantities several days subcutaneously, it produces inflammation of the kidney which often cannot be distinguished from parenchymatous nephritis, vomiting, diarrhœa, jaundice, and inflammation of the intestine. The symptoms are exactly similar to those of chronic poisoning by iron, and apparently nearly allied to those of nickel and cobalt. It would appear that all soluble metallic salts irritate the kidney during their elimination. It certainly is the case with lead, iron, nickel and cobalt; arsenic and phosphorus produce fatty degeneration of the kidney, and chronic poisoning by mercury also causes disease of this organ. The conditions of the kidney caused by metallic poisoning might be grouped under the name metallic kidney, and this might be divided into the acute and the chronic form. When it is very chronic an extensive caseation (instead of disappearance) of the secreting structure of the kidney may occur. In chronic poisoning the blood gases remain unchanged nearly to the end. The glycogen of the liver does not disappear so quickly either by chronic manganese or iron poisoning as by phosphorus poisoning. The excretion of the metal appears to take place chiefly if not exclusively in the tubules, but when the blood-pressure was lowered the metal appeared also in Bowman's capsule. [*Practitioner*, xxx. 64]. (*Archiv. für exper. Path. und Pharm.* p. 361, vol. xvi.)

**Action of Adonis Vernalis.**—This plant belongs to the order *Ranunculaceæ*. It has been found by Cervello (*Archiv für exper. Path.* p. 235, vol. xv.) to contain a glucoside, adonidin. This substance has an action very much like that of digitalis. It lessens the power of voluntary muscles and raises the blood-pressure. It does not seem, however, to be cumulative. Its physiological action as well as its therapeutic uses have been further investigated by Bubnow, who finds that the action on the frog's heart is like that of digitalis, and considers that it stimulates first the inhibitory apparatus, and the motor centres of the heart. It increases the contractility of the cardiac muscle, and the amount of work the heart is able to do. It causes contraction of the arterioles. In warm-blooded animals, also, it acts like digitalis; but though no difference can be noticed between the action of adonis and digitalis on animals, yet clinically there is a difference between them, inasmuch as some cases of disease which did not improve under digitalis, improved rapidly under adonis and *vice versâ*. It is to be noticed that adonis is more liable than digitalis to cause sickness, vomiting, and diarrhœa. [*Pract.* xxxi. 67.] (*Deut. Archiv für klin. Med.*, p. 262, vol. xxxiii.)

**Suture and Transplantation of Nerves.**—Dr. E. G. Johnson of Stockholm, in a long and interesting paper in a recent number of the *Nordiskt Medicinskt Arkiv*, after referring to the literature of the above subject, gives the results of his own experiments made in the laboratory of the School of Medicine at Stockholm. In sixteen cases he reunited, by means of a catgut suture, the entirely divided ends of the sciatic nerve. The re-establishment of the nervous influence by the cicatrix was observed on the fortieth day in the experiments on rabbits, on the thirty-first day in those on dogs, and on the twenty-fifth on fowls. In twenty experiments on rabbits the two ends of the sciatic nerve were not reunited, and the passage of the nervous influence by the cicatrix in these cases was not observed till after sixty days. The presence or absence of this influence was indicated by the excitation of the nerve, above the cicatrix, by means of a weak induction-current or by mechanical excitation. In the experiments on rabbits, microscopical examination showed on the fortieth day in cases of suture of the nerve, and on the sixtieth day in those of simple section, bundles of amyelinic nervous fibres passing across the cicatrix from the central extremity of the nerve to its peripheral parts. In reference to the transplantation of nerves, Dr. Johnson has succeeded in inserting, in the deficient intervals of the sciatic nerve of two fowls, portions of the sciatic nerve of other fowls, and in the sciatic nerve of a third fowl a portion of the sciatic nerve of a rabbit. The first two fowls were killed at the end of twenty-eight days and thirty-four days respectively, and the third after twenty-three days. The portions of the transplanted nerve were perfectly grafted on the original nerve, but the nervous influence through the cicatrix did not exist in any of the cases. Microscopical examination exhibited a very evident contrast between the portion of the central nerve where the degeneration was but slight, the intermediate portion where the myeline was very much subdivided, and the peripheral portion where scarcely any traces of myeline were to be found. (*Med. Times and Gaz.* Sept. 8, 1883.)

**Treatment of Vascular Tumours without Operation.**—Floriani has recently treated six cases of telangiectasis with sublimate collodion (15 per cent. solution). The collodion is put on in four layers by means of a camel's-hair brush, each layer being allowed to dry thoroughly before the next is applied. On the fourth day the edges are raised and a second series of four applications are made, this being repeated every fourth day until the swelling disappears and the edges are depressed. After the crust falls off the place seems depressed and reddened, but soon resumes its normal colour. This treatment is painless and requires only one or two months to cause an angiomatous tumour to disappear. (*Allgem. Wein. med. Zeit.*, No. 32, 1883.)

**Eczema of the Scalp in Infants.**—Dr. Lassar employs the following formula :—Salicylic acid one part, tincture of benzoin two parts, and vaseline fifty parts. A certain quantity of this is smeared over the scalp two or three times a day, after the infant's head has been washed with soap and water. To soften the scabs and to facilitate the cleansing of the scalp, Dr. Lassar recommends the employment of oil containing two per cent. of salicylic acid. (*Gaz. Médicale,* Aug. 1883.)

**Sulphide of Zinc in Lupus Erythematosus.**—Dr. Duhring, of Philadelphia, recommends the use of a lotion composed as follows :—

| | |
|---|---|
| ℞.—Zinci sulphatis, | |
| Potassii sulphidi, | āā ʒss. |
| Aquæ rosæ, | ℥iijss. |
| Alcoholis, | ʒiij.—M. |

A few minims of glycerine may be added with advantage in some instances. The use of this wash should be preceded by that of soap to cleanse the surface from crusts, etc., when these are present. Castile soap is usually sufficient, but sometimes the spiritus saponis kalinus may be used in preference. The effect of the wash is cooling. Three cases were adduced to show the effect of the lotion in modifying the action of spreading lupus erythematosus. (*Philad. Med. News*, Sept. 8, 1883.)

**A Method of Hastening the Anæsthetic Action of the Ether Spray.**—The ether spray is employed frequently at the Hôpital St. Louis in Paris for the production of local anæsthesia. A little device, first indicated by Dr. Letamendi, of Barcelona, but not hitherto utilised in practice, is employed by Dr. Vidal to shorten the duration of the process of congelation. It consists in making a slight prick with a needle at the point upon which the spray is directed, at the moment when the skin assumes a purplish hue, and when the ether commencing to solidify assumes an oily consistency. The little puncture made at this time excites a reflex constrictive action of the vaso-motor nerves, the blood is driven from the part, and the skin becomes white. Another method of hastening the process consists in placing little wads of lint about the part, thus increasing the surface of evaporation. (*Revue Médicale*, June 30, 1883.)

**Action of Uva Ursi and Arbutin.**—Dr. Lewin, along with F. Behrne, a student, has made experiments on the action of uva ursi. These leaves contain tannin, gallic acid, an insoluble body *urson*, and a glucoside *arbutin*. Arbutin is a bitter substance readily soluble in water, which decomposes on boiling with dilute acid into sugar, methyl-hydroquinone, and quinone. Arbutin does not ferment when mixed with yeast at ordinary temperatures. It turns polarised light to the left, but after decomposing by boiling with acids the solution turns the polarised light to the right on account of the sugar it then contains. Hydroquinone is optically inactive. Arbutin is not separated from solution by shaking with animal or vegetable charcoal. As uva ursi is usually employed in the form of a decoction, the insoluble urson cannot be present in the preparation, and therefore can take no part in the therapeutic action of the drug. A part of the beneficial action of uva ursi in chronic catarrh of the bladder may be due to tannic or gallic acid, but a great deal of it is not, for tannic and gallic acids will not have the same beneficial action as uva ursi. The utility of uva ursi must therefore depend to a great extent upon the quantity of arbutin that it contains. When this substance is administered internally or injected subcutaneously, it undergoes in the body changes similar to those produced by boiling with acids, or by the action of emulsin. A substance occurs in the urine which in a short time becomes olive green or brownish green; this substance is hydroquinone. It is excreted in the form of hydroquinone-sulphuric acid. When the urine is decomposed and becomes alkaline either in the bladder or by standing in air the hydroquinone-sulphuric acid splits up and yields free hydroquinone, which gradually becomes oxidised and darkens in colour. But the whole of the arbutin administered does not decompose in the body into hydroquinone and sugar: a part of it is excreted unchanged in the urine as is shown by its turning polarised light to the left. Arbutin itself is not poisonous, and any poisonous action which it may exert can only be due to the hydroquinone which it yields: the hydroquinone-sulphuric acid is not poisonous, and poisoning is only likely to occur when the hydroquinone-sulphuric acid splits up equally in the body, and especially in the bladder, so that the urine is already dark when passed, and absorption of hydroquinone may occur in the bladder itself. Hydroquinone possesses antizymotic and antiseptic properties. When fresh and pure even solutions of it containing 1 to 3 per cent. are not irritant, but when they begin to decompose and become brown they become irritant. This irritation will be particularly useful to the mucous membrane of the bladder in catarrhal conditions. The uva ursi then, owes its activity to the antiseptic and irritant action of the hydroquinone which it yields; but hydroquinone cannot be well employed in place of uva ursi, as in all probability its formation in the bladder itself is one of the important points in its therapeutic action. The quantity of arbutin contained in the decoction of uva ursi as usually administered is too small to be of any great service. When the decoction is made stronger it is apt to irritate the stomach, and causes nausea from the amount of tannin that it contains. This may be to a great extent removed by shaking with vegetable charcoal, but a much better plan is to give pure arbutin either in the form of a powder, or in solution according to the following prescriptions:—

℞. Arbutini, 1 grain,
Sacchari, 0·5 grain.
Ft. pulvis.

or

℞. Arbutini, 5 grains.
Aq. destill, 100 grains.
Ft. solutio.

The dose and the frequency of its repetition will depend upon the gravity of the case. (*Virchow's Archiv*, vol. 93, June 1883.)

In a notice of arbutin Dr. H. Menche states that he has found it in many cases to be a most efficient diuretic. It is given for this purpose in doses of about twelve grains per diem, but may be administered in much larger quantities without producing any unpleasant effects. In catarrh of the urethra or bladder, larger doses are advised (forty-five to sixty grains a day). As it is excreted in part as hydroquinone, and as injections of a 1 or 2 per cent. solution of this latter substance are said by Brieger to be most efficacious in the cure of gonorrhœa, the author suggests that we might in this way avoid the use of the syringe, the topical remedy being contained in the urine. Arbutin exists in the form of fine white, needle-shaped crystals, unchanged by exposure to the air. It is readily soluble in water, has a slightly bitter taste, and no odour. The easiest mode of administration is in the form of powder, which may be dissolved in a tablespoonful of water. It is somewhat expensive, the present price in Germany being about twelve shillings an ounce. (*Centralblatt für klinische Medicin*, July 7, 1883.)

**Beer in Asylum Dietary.**—There are at least twenty-seven pauper lunatic asylums in England in which the use of beer as an article of ordinary diet has been discontinued. In no instance does it appear that this apparently important change has led to inconvenience or other unsatisfactory result. On the contrary many of the superintendents in whose asylums the modification has been made and, through them, many of the patients, testify cordially to the benefits arising from the change. The question is not one of teetotalism or even primarily of a financial order, but one of pure expediency and good management. In all probability the disuse of beer as an element of the diet of pauper lunatics in English asylums will be still more extended, and will be watched with interest. The fact that the change is not allowed to extend so as to place it beyond the will or the power of superintendents to order a good quality of stimulants in special cases shows that the modification rests on a sensible basis. (*Journal of Mental Science*, 1883.)

# Notes and Queries.

AMERICAN BREAKFAST CEREALS.—The American Cereal Company has prepared wheat, barley, oatmeal, and maize by acting upon them with steam; they are then broken up into a coarse meal. Besides this they prepare a mixture which they call cereal-milk for infants, and one called cereal-cream for dyspeptics. The analyses which they publish from Professor Church of Oxford show, as far as such analyses can, that these foods are good; but analyses in relation to such things are of comparatively little value. We have, however, given them a trial with children, and we find that they succeed very well, the children both liking them and thriving upon them. We have not tried them with dyspeptics, but have little doubt that they will answer well in many cases of weak digestion.

MALT JELLY.—Messrs. Allen and Hanburys have prepared a jelly purporting to contain half its weight of their malt extract, and pleasantly flavoured with malaga, raspberry, or vanilla. The treacle-like viscidity of the ordinary preparations of malt has been a drawback to their use with fastidious patients. The malt jelly is free from this, being as firm as a well-made calf's-foot jelly, and free from much of the sickly taste of malt extract; the little that remains of this is further disguised by the use of slight but appreciable flavourings. We have had the jelly tested in the physiological laboratory, and find that it contains a fair quantity of very active diastatic ferment. In cases where malt is required as a kind of food, and not for partially digesting other starchy food before ingestion, this jelly seems to offer several advantages. One specimen, which we kept for some time longer than the others, became slightly musty, and we infer that the preparation should be used fresh.

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⁂ Any of the foreign works may be procured on application to Messrs. DULAU, of Soho Square, W.C.; WILLIAMS and NORGATE, of Henrietta Street, Covent Garden, W.C.; or BAILLIÈRE, of King William Street, Charing Cross.

# Department of Public Health.

## CONTRIBUTIONS TO A STUDY OF THE CAUSES OF EPIDEMIC DIPHTHERIA.

BY ARTHUR DOWNES, M.D.

(*Continued from* p. 400.)

### II.—INFLUENCE OF SEX.

THE tables (IV. and V.) with which my last article concludes are not put forward by me as affording even approximate standards of the normal age-incidence of diphtheria, nor must they be regarded as furnishing at the best more than a general indication of the probable truth.[1] My purpose is to point out what seems to me the loose nature of our present knowledge of this and kindred matters, to suggest to the best of my ability in what manner it might be established on sounder and more rigid foundations, and to contribute my own quota to those statistical bases on which alone I think it can securely rest.

I believe that in Mr. Power's method we possess the means of acquiring such a perception of the age-incidence of diphtheria as shall be sufficiently near the truth for practical purposes. But in its application there must be borne in mind certain disturbing elements for which due allowance and correction must be made as far as possible in collecting data and in framing results. Such sources of fallacy, for example, would beset an observer who assumed without most careful inquiry that the persons tabulated by him had been exposed to no other risk of infection save that which I have termed home-risk, or that, if exposed to other risk, they were so in equal degree for each age-group. Then there is a very important consideration, to which I shall refer later on, in the question of variations in intensity of diphtheric infectiousness. Nor must it be too hastily taken for granted that even in narrow cottage homes the exposure to home-risk of infection is equal for each age and for either sex.[1] And there remains the inquiry whether there may not be differences in the normal proclivity to diphtheria of males as compared with females—physiological differences, that is, *quâ* sex. To put an extreme case, should we feel justified in applying to the elucidation of an epidemic among the nuns and school girls of a convent, a standard of normal age-incidence derived from observations of diphtheria in a community of monks?

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[1] Numerically the observations are insufficient to determine even the broadest generalisation set forth in Table V., namely, that of 986 persons of all ages exposed to diphtheria, 22·8 per cent. will probably take the infection. Assuming that positive and negative errors are equally probable, the true mean result might lie anywhere between 19 and 26·5 per cent. Still there can be but little doubt that the normal age-incidence of diphtheria is greatest on those ages which are more especially the school-going ages; and the important lesson which follows from this is, that in the investigation of diphtheria outbreaks, as Mr. Power has pointed out, care must be taken to discriminate between this incidence and supposed school-influence.

If I were collecting afresh the facts on which I have based my tables I should take account of sex-distribution as well as of age. For I have come to suspect that there may be a greater physiological sex-incidence of diphtheria on one sex than on the other; and there is, I think, some reason to surmise that the direction of this incidence may differ at various ages.

I am writing without large means of reference to authors, but I think am right in stating that while some writers deny that sex has much influence, or even that it has any influence whatever, and most ignore the question, none discuss it on those rigid lines of science which must be followed if medicine is to be raised from the domain of empiricism to that of law. It is, however, an observation of old date,[2] that in the gross the incidence of diphtheria is proportionately greater on adult females than on adult males. A probable explanation of this, in part at least, is suggested by Dr. Thorne-Thorne in a report on an extensive epidemic of diphtheria at Coggeshall some years ago. "Below the age of twelve years," he writes, "the influence of sex has been but slight . . . . but beyond that age its effect has been more marked, thirty-nine of those attacked being females, and only twenty being of the male sex. It is very possible that this difference may simply be due to the circumstance that males in youth and adult age spend much less of their time in infected houses and amongst the sick than girls or women would do, and thus it would become a question of more or less exposure to infection."[1]

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[1] Age-incidence may hereafter be found, also, to vary in different epidemic cycles and with different types of diphtheria.

[2] See, for example, "Daviot's Account of the Epidemics observed by him in 1841–4."—*Sydenham Society's Transactions*, p. 363.

This explanation doubtless covers much, it may be all, of the preponderance of attacks on adolescent females, but it is not so certain that it could be similarly applied to any excess of diphtheria among girls of more tender age.

But does such excess exist in fact? A study of Table I. (p. 397) induces me to think that it does. From that Table I have compiled the following in such form as to facilitate comparison between the death-rates at various ages from diphtheria of males and females in England and Wales for the decade 1861—70. And I have annexed a similar comparison for the decade 1851—60, together with statistics of like kind relating to scarlet fever for 1861—70.

In this table the male death-rate at each age is taken as a standard, and the relative excess or deficiency in the corresponding female rate is expressed as a plus or minus percentage of that standard.

### Table VI.—England and Wales.

*Percentage excess or deficiency in female death-rates from Diphtheria and Scarlatina at certain ages as compared with the corresponding death-rates of males.*

| Age in years. | –1 | –2. | –3. | –4. | –5. | 5—10. | 10—15. |
|---|---|---|---|---|---|---|---|
| Diphtheria, 1861—70 . | –24 | –3 | +10 | +10 | +24 | +33 | +60 |
| ,, 1851—60 . | –10 | –5 | +5 | +13 | +18 | +27 | +50 |
| Scarlatina, 1861—70 . | –16 | –8 | –2 | –3 | –2 | –3 | +15 |

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[1] *Report to the Local Government Board*, 1877.

This clearly shows that in the first and second years of life the mortality from diphtheria, relatively to the numbers living at each age, is greater in males than in females, but that after the second year this relation is reversed in a ratio progressive with the age; so that for ages 5—10 the female death-rate from diphtheria is about 30 per cent., and from ages 10—15 not less than 50 per cent. greater than the like death-rate at each age-group for males. The numbers here dealt with are too large to admit of question as to their sufficiency, and the coincidence between the series for 1851—60, and that for 1861—70 is so remarkable that no doubt should, I think, be entertained of the fact here stated.

We must conclude, therefore, either that females aged 2—15 are for some reason attacked by diphtheria in greater proportion than are males of similar ages, that diphtheria is more fatal, relatively to numbers attacked, to girls of the ages in question than to boys, or that these conditions exist in co-operation.[1] If it should be shown that increased fatality in proportion to attacks is insufficient alone to account for the facts observed, then it would follow that girls aged 2—15 do suffer more attacks than boys, and the question would arise how far this might be due to greater exposure to infection, and how far to a greater physiological proclivity to diphtheria.

It would be difficult, however, to understand in what notable degree girls of from four to ten years of age should be so specially

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[1] Here we want good statistics on a large scale of the percentage of fatal cases to attacks of diphtheria in males and females respectively at various ages. I have none to offer on such a scale. The following are from my note-books, from Daviot's Essay, and the Report on Coggeshall before referred to:—

*Fatal cases of Diphtheria and attacks at various ages.*

| Age in years. | | −5. | 5—10. | 10—15. | 15 + | All ages. |
|---|---|---|---|---|---|---|
| *Males.* | Attacks . . . . . . | 105 | 123 | 79 | 77 | 384 |
| | Deaths . . . . . . . | 20 | 24 | 5 | 2 | 51 |
| | Percentage of deaths to attacks . . . | **19** | **19** | **6** | **2** | **13** |
| *Females.* | Attacks . . . . . . | 115 | 127 | 82 | 128 | 452 |
| | Deaths . . . . . . . | 16 | 25 | 10 | 6 | 57 |
| | Percentage of deaths to attacks . . . | **13** | **19** | **12** | **4** | **12** |

exposed to the infection of diphtheria in comparison with boys of the same age. If it be sought to explain that girls of the ages in question contracted more diphtheria than boys in consequence of a greater domesticity, already manifesting itself in their characters, and by reason of more constant association with the sick, it is difficult to understand why a similar result should not be found in the case of scarlatina.[1]

It appears to me, therefore, a reasonable conclusion that if the proportion of fatal attacks to total attacks among females aged two and upwards is insufficient to account for the observed excess in their death-rate from diphtheria, this excess is probably due to their greater physiological proclivity to take the infection.

## III.—ON VARIATIONS IN THE INTENSITY OF DIPHTHERIC INFECTION.

In this section I approach what I believe to be one of the most important features in the natural history of the diphtheric *contagium*; and in the concluding paper of this series I hope to adduce evidence which, if confirmed by the future observations of others, will bring this feature into yet greater prominence, and may, I venture to think, afford a clue of value to preventive medicine.

It will be familiar to those who have followed during recent years the progress of bacterial pathology that one of the questions on which experimenters have been, and still are, engaged, is the question of association of variations of virulence, or of vigour, with variations in the circumstances of infectious organisms, or with changing phases of their life. Mutation in potency is, indeed, a necessary corollary of the theory of lary of the theory of *contagium vivum* ; on the one hand growth, increase, energy, on the other, degeneration, diminution, and decay. Granting the *contagium vivum*, you admit as an inevitable consequence its variability.

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[1] It is true that between diphtheria and scarlatina this difference exists that the one is commonly held to confer on the individual by a first attack a very large measure of protection against a second, while the other is believed to carry with it little or no immunity for the future. I do not think, however, that this can affect the present comparison, for in scarlet fever, if the mortality may be taken as an index of number of attacks, boys living at ages, two to ten, would be to a greater degree protected by a first attack than would girls of the same age. See Table VI. It may be interesting to note (Table I.) that in whooping cough the death-rate of females, relatively to numbers living, is largely in excess of the corresponding male-rate at all ages. In measles the differences are not very notable.

And the study of epidemics furnishes nothing to controvert this proposition. On the contrary, whether we follow their minuter progress, or, with Sydenham, note a difference in their cycles on a larger scale, we find throughout, the constant character of variation.

Now, in this character there may, between different zymotics, be traced differences of degree. Who, for example, would class diphtheria with small-pox, or with measles, in certainty of infectiousness? In his report on the severe outbreak at Coggeshall, previously referred to, Dr. Thorne-Thorne found that in 50 per cent. of 179 households invaded by epidemic diphtheria, and freely exposed to chances of infection,[1] no extension from the case first attacked took place. Small chance would 50 per cent. of persons, unprotected by previous attack or by vaccination, have of escaping the poison of small-pox or of measles. It may be ceded on this evidence, I think, confirmed as it is by other and ample testimony, that the ordinary standard of diphtheric infectiousness is small, whether we regard it on the hypothesis of an enfeebled germ, or of low receptivity of the poison on the part of those exposed to it.[2]

On the other hand there is equal evidence that on occasion, diphtheria may do its work as thoroughly as, though usually within a smaller range than, the most fatal small-pox. I may instance the reports of recent epidemics in Russia, and, on the smaller scale more commonly observed, the fatality of such outbreaks as that at Wickham-Bishops, narrated in the next section, and the numerous cases in which four or five of a single family or even whole families have within a brief space been swept off by this disease.[1]

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[1] Freely, because all, or nearly all, were cottage homes of the poorer class. My own experience fully corroborates this, and the evidence of most writers and reporters on diphtheria is to the like effect.

[2] On either hand, whether the primary case be really sterile, or whether the persons exposed to the infection may be, from some cause or other, insusceptible, these facts have an important bearing on the application of that method for determining the normal age-incidence of diphtheria described in Section I. They necessitate that the observations to which the method is applied should be very numerous.

I may say, in short, that I am not aware of any current zymotic of this country which in its uncertainty and variability of infectiousness equals diphtheria.

# THE CONTAGIOUSNESS OF ERYSIPELAS CONSIDERED WITH ESPECIAL REFERENCE TO RECENT RESEARCHES.

BY HENRY F. A. GOODRIDGE, M.D., F.R.C.P.,

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In a letter in the *Lancet* of May 26th last, remonstrating against the non-admission of cases of facial erysipelas into the ordinary wards of hospitals, Mr. T. Holmes wrote:—"It has always seemed to me that erysipelas, though no doubt under some circumstances contagious, is very feebly so, and that when it spreads in an hospital it does so in consequence either of carelessness in nursing, or of impurities in the wards, far more frequently than from contagion; in fact, I have never myself seen a case in which I could trace contagion."

After a pretty long experience in a provincial hospital where cases of facial erysipelas, numbering on an average of the last twenty years about four per annum, have always been admitted into the ordinary medical wards, I can so far bear similar testimony. I have never known the disease spread from bed to bed. Moreover I am acquainted with two or three instances elsewhere of genuine erysipelas in which husband and wife occupied the same bed during the entire illness, without the patient in either instance communicating the disease. Facts like these, and they could doubtless be largely added to from the experience of others, seem almost to raise the question whether under any circumstances erysipelas be contagious. It is proposed to inquire a little into the value of such facts as objections to the current doctrine, and then to glance at the affirmative evidence now adducible in proof that erysipelas *does* possess the property of contagiousness, using this term in its widest acceptation as signifying material contact, mediate as well as immediate, and thus including aerial infection.

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[1] See, for example, Dr. Thursfield's evidence, in the *Lancet*. "I have seen a family of six children destroyed in two or three weeks."

(1) Many authorities concur with the one above quoted in regarding this disease as only feebly contagious, *e.g.* Billroth, who says: "It is propagated by a contagium which is considerably less infectious than that of measles or scarlet fever."[1] The difficulty, according to recorded testimony, of producing erysipelas artificially (except by a method afterwards to be noticed) would seem to tell much in favour of this view.

(2) All true erysipelas, according to Trousseau, is traumatic, that is to say, it never develops itself otherwise than in dependence upon a previously existing open wound or solution of continuity, not necessarily a large one, it may be only a slight excoriation, nay, a lesion so small that the person himself may be hardly aware of it. Moreover, in regard to facial erysipelas, such lesion, when not present on the external integument, may frequently be found in the mucous lining of the mouth or nares. It constitutes, in fact, the primary spot of infection, and the starting-point of the inflammatory process. Most subsequent writers have adopted these views of Trousseau's, and they seem generally to be in accord with clinical experience. The failure of the disease to spread, then, in the instances above referred to, might be in great measure due to the absence of this essential condition of receptivity.

(3) Immunity from liability to attack, that is, under all circumstances, probably does not obtain to any appreciable degree. As in the case of small-pox, there may be a few very exceptional individuals originally insusceptible of the disease; but, notwithstanding the frequent denial of immunity acquired by a previous attack, evidence, it will be seen, is forthcoming to show that protection within certain limits is conferred thereby.

(4) As is only a familiar truism, from superficial resemblances,

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[1] "Billroth's Surgery" (Sydenham Society's Translation), vol. ii. p. 9.

which may be very close, diseased conditions are apt to be confounded together which yet are fundamentally distinct. Let me briefly relate some personal experiences of my own. It has been my lot to suffer from erysipelas of the head and face on three different occasions, this being said with a qualification that will appear in the sequel.

My first attack was in May 1873. I had been troubled for two or three days previously with a gum-boil connected with a carious bicuspid of the right lower jaw; I had not been attending any erysipelas patient, but some cases were said to have occurred here and there in the neighbourhood. Suddenly in the forenoon I was seized with chilliness, malaise, vomiting, &c., and the temperature quickly ran up to 102° Fahr. in the axilla. The following morning over the right malar bone redness and tension were for the first time observed; the malaise became intense, the tongue was foul and dry, and there was much hard violent cough. During the third and fourth days of the attack the temperature was at 105°, the pulse was 84, the symptoms had increased, and the erysipelas had extended so as to include within its area both ears, there being, however, no vesiculation. On the fifth day defervescence commenced, and the advance of the inflammation was arrested. Resolution ensued, and convalescence proceeded without interruption. It was upwards of three weeks before the desquamation disappeared.

My second attack was in 1874 at Frankfort on the Maine. I had been much exposed to the direct rays of a brilliant August sun in journeying thither, and on the evening of arrival, being otherwise in usual health and without any local breach of surface, I experienced a feeling of heat and stiffness over the right malar bone, and significant appearances were visible. The next day the local affection was only too distinct, the efflorescence occupied a larger area, and ultimately the extent was not very much less than on the previous occasion; but this time I had little or no constitutional disturbance, I had no appreciable elevation of temperature, my appetite remained unimpaired, and, though subject of course to some inconvenience, my movements were not so very much interfered with. On my return to England after a fortnight's delay there was sufficient desquamation remaining to tell the tale to a medical friend who was otherwise uninformed.

My third attack was at the time of the memorable bridge accident in Bath in 1877. The hospital here was taxed to its utmost resources to provide accommodation for the sufferers, and into one ward containing them, which (though not *just then* so occupied) had been used from time to time for the isolation of cases of surgical erysipelas, and into which my duty seldom or never called me, I entered for a few minutes on this occasion. I happened to have at the time one or two little sores on my occiput from using a hard hair-brush, but my general health was good. Little more than twenty-four hours afterwards I was seized with rigours, malaise, tenderness and swelling of the lymphatic glands of the neck, and a rapidly rising temperature. The next morning there were distinct appearances of erysipelas upon the face; I became very prostrate; and the temperature was 103·6°. On the third day the redness and swelling had increased, the sleep was disturbed, the tongue was furred, with complete anorexia, the pulse was 80, and the temperature 104°; the same night it rose to 106·8° and there was a little delirium. The fourth day the temperature fell to 104·6°; the entire head and face, except the chin, being now more or less involved. The defervescence continued, convalescence set in and pursued its course uninterruptedly, with the desquamation as usual.[1]

Varieties of type of erysipelas have been noticed by most writers, but only in very vague and indefinite terms. In the three attacks now succinctly described, it will be observed that there was a marked difference, the more marked, too, from their all occurring in one and the same subject. No. 2 differed greatly from Nos. 1 and 3. Is this fact referable to any difference in their essential nature? "Inflammation," says Professor Burdon Sanderson, "is the physiological effect of injury;" and from the researches of himself and others he is led to conclude that "the process of inflammation is essentially a terminable process, that is, one which has no tendency to spread or last beyond the limits of its proximate cause;" whence, he adds, "it necessarily follows that if we meet with an inflammation which does not cease on the removal of its assigned cause, this means that there is another latent noxa at work."[1] Looking at attack No. 2, then, in the light of this teaching, it will be seen that sunburn had injured certain parts of the exposed integument, no solution of continuity of the same or of the adjacent mucous surfaces co-existing. Inflammation ensued; it did not, however, spread beyond the limits of its proximate cause, its extent coincided with the area injured, and its intensity and duration were doubtless in proportion to the amount of damage done. It is true that the inflammation *appeared* to spread, but it was appearance only, and just what would readily mislead in similar cases. I am satisfied that this was really nothing more than that one spot was the starting-point of the process, just as is sometimes seen in the case of a blistering plaister applied to the skin but prematurely removed. There was no attendant constitutional disturbance. This attack, then, presenting all the usual naked-eye features of erysipelas, but without the tendency to spread, and resolving without delay, was clearly an instance of simple, non-infective inflammation, a simple dermatitis.

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[1] I was kindly attended during attacks 1 and 3 by my lamented friend and colleague, Dr. R. W. Falconer. The memoranda, made at the time, were put together during my convalescence on each occasion.

On the other hand, attacks Nos. 1 and 3, were as distinctly infective. The circumstances of their origin, their mode of onset and progress, and the severe constitutional disturbance attending them, all suggest this view. In No. 3 there was exposure to an atmosphere containing, without doubt, the specific contagium of erysipelas, the conditions for its introduction into the body and morbific development therein being at the same time present. Nor was there much room for question that a like origin obtained in No. 1. The virulence of the contagium showed itself not only in the marked advance of the inflammatory process from part to part, but in the rapid production of an intense pyrexia. In short, in these attacks (1 and 3) there was in the words of the pathologist last quoted, "another latent noxa at work"—the noxa of genuine erysipelas.

I am thus led to the conclusion that in cases of facial erysipelas, as they ordinarily present themselves in practice, whatever secondary varieties may exist, there are primarily two distinct forms to be dealt with, viz. the infective and the non-infective forms, or, as the distinction, it will be seen, may otherwise be expressed, true genuine erysipelas and spurious or pseudo-erysipelas. Without venturing to indicate in what ratio these two forms stand to one another as to frequency of occurrence, I am quite sure that I have again and again seen and treated cases of the latter—cases in which the local affection has followed exposure to heat or cold or other injurious influences, and the fever and general disturbance have been comparatively insignificant. Mr. Jonathan Hutchinson, in his paper "On Certain Diseases Allied to Erysipelas," clearly recognises their existence when he says: "These forms of erysipelas which are due to local irritation are, I think, almost always mild. It is when the disease is due to contagion that it assumes its greatest severity." [1]—If, then, in any given number of cases of ordinary facial erysipelas there be a more or less considerable proportion of cases of the non-infective form, a further step is gained towards the better understanding of those otherwise startling facts which presented themselves at the outset, and which seemed at once to bar the possibility of erysipelas being contagious.

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[1] "Lumleian Lectures on Inflammation," *British Med. Journ.*, 1882.

To turn now to the affirmative side of the question. Some evidence to show the contagiousness of erysipelas has been adduced already, and attack No. 3, above given, I hardly need say was for me too much of an *argumentum ad hominem* not to carry conviction with it. As also coming within the sphere of my observation, I may mention that of seventy-five cases of erysipelas of the head and face admitted into the medical wards of the Bath Hospital during the twenty years ending December 31, 1882, there were nine (or twelve per cent.) furnished by the nurses and assistant-nurses of the institution. Probably there are few practitioners of experience, particularly if on the medical or surgical staffs of hospitals, who could not produce from their own practice similar evidence, and it is significant that those who seem most in earnest to minimise the contagiousness of the disease, by no means go the length of denying it. If the literature of the subject be searched, there will be found no lack of instances of its propagation by contagion—*vide, e.g.* Trousseau's tenth lecture (vol. ii. *Syd. Soc. Trans.*), and the article by Zuelzer in Von Ziemssen's *Handbuch*, besides many English records. But the most important evidence of all is that supplied by histological research and experimental pathology, that is to say, the evidence of a *contagium vivum*, and it remains to consider this.

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[1] *Medical Times and Gazette*, 1883, vol. i. p. 6.

The presence of micro-organisms in erysipelatous tissues, in the lymphatics, and in the capillaries, had already been observed by several investigators, but owing to the defective methods employed, the want of a differentiation morphologically of the forms observed, and the confounding together of allied but yet distinct pathological states in which they were also to be found—the observers themselves, too, being far from agreed as to the part which these organisms played in the production of the disease—no generally satisfactory results were arrived at. Such being the case, Dr. Fehleisen[1] of Berlin set to himself the task (1) to determine whether in erysipelas a species of bacteria peculiar to it is regularly demonstrable, and (2) if this be so, to inquire whether this micro-organism stands in any ætiological relation thereto. For the first purpose Fehleisen excised a small piece of skin from the diseased part in each of eleven patients suffering from erysipelas, and in each one of the eleven found the lymphatic vessels of the skin, as well as those of the subcutaneous adipose tissue, and especially those of the most superficial layer of the corium, filled with micrococci arranged in chains. The same in zooglœa-masses were here and there seen in the lymph-spaces, but, contrary to the older observations, they were never found in the blood-vessels. The micrococcus was identical with one already figured by Koch. To demonstrate that this was a specific organism, and that its presence was not merely accidental, Fehleisen next attempted to cultivate it outside the body. After frequent failures when the contents of erysipelatous bullæ were employed, he at length succeeded in breeding the micrococcus when the freshly excised pieces of skin, previously purified and disinfected, were cultivated upon Koch's meat-peptone-gelatine preparation. Proceeding in this way, in the course of two months he produced fourteen generations. Fehleisen had found somewhat similar organisms in the pus of wounds, in pyæmia, and in phlegmonous abscesses, but these never behaved in the same manner as regards the pure cultivation in gelatine. The mode of growth, then, of the micrococcus of erysipelas was found to be characteristic. The question remained, Could it, when inoculated into healthy individuals, produce genuine erysipelas? Experiments were made first upon rabbits. Nine were inoculated on the tip of the ear with the pure and cultivated micro-organisms. One of the animals showed an immunity, reacting to several inoculations with only a slight redness around the puncture, unattended with elevation of temperature, but in the other eight a typical erysipelas was developed. In from thirty-six to forty-eight hours the temperature rose, and a characteristic rash appeared, which gradually spread to the root of the ear, and thence to the head and neck. The disease took from six to eight days to run its course, and ended in recovery. None of the animals died. In one case the ear was amputated during the height of the disease, and on examination the lymphatic vessels were found to be filled with the micrococci. Lastly, and here culminates the interest of Fehleisen's work, he performed inoculations of the pure and cultivated micrococci on the human subject. He did so on the principle that an attack of erysipelas has been proved beneficial in such diseases as cutaneous tumours, lupus, carcinoma, and lymphadenoma.[1] In six cases of this sort, then, experiments were instituted. After a period of incubation, varying from fifteen to sixty hours, the characteristic phenomena were developed with greater or less distinctness in each one of the six. The initial rigor, the well-marked pyrexia (the maxima of temperature attained ranging from 104° to 106·8°), the sharply-defined redness, the more or less rapid spread over the surface, the wandering character of the rash, the course of the fever, and finally the issue in resolution—the recovery taking place without suppuration and formation of abscess—left no room for doubt that the inoculation of these patients with Fehleisen's cultivated micrococci had for its result the production, or rather the reproduction, of a genuine erysipelas; and in attestation thereof the cases during their progress were repeatedly examined by Professor Bergmann and several experienced colleagues. It may be added that the beneficial therapeutical effects were marked in nearly every instance.

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[1] *Die Aetiologie des Erysipels.* Von Dr. Fehleisen. Berlin: 1883.

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[1] See a case in *Practitioner*, xxxi. 48.

Assuming, then, the correctness of these researches (and the histological particulars are said to have been verified by MM. Cornil and Babes), the proof of the contagiousness of erysipelas would seem to be complete; the specific nature of the contagium and its ætiological relation to the disease are both alike demonstrated. If, as is sometimes done, it be objected to pathological experiments on the lower animals, that to reason from them to man may be fallacious, it is seen here that identically the same experiments that were performed on them were performed upon man himself and with similar results. If, again, the further objection be urged that the experiments were made upon man in a diseased and not in a healthy state, besides the similarity just noticed, the fact that there was some variety of disease in the six subjects of experiment, while the result obtained was uniform in all, tends greatly to deprive it of its force. For details, however, I must refer to the original monograph.

At the same time that the transmissibility of the disease from man to man by direct contact is thus shown, it is to be observed that this may not be the only mode of infection. There is good reason to believe that, besides *within* the human or animal body, the erysipelas-cocci propagate themselves *outside* of it, and may be diffused in swarms through the air. Fehleisen found them propagable on potato and at ordinary temperatures; therefore under conditions similar to what are frequently presented to them in the external world. Hence, in those not uncommon instances where in the causation of the disease *immediate* contact cannot be traced, *mediate* contact or aerial infection may justifiably be inferred, the specific contagium and the reality of the contagion being alike in both cases. And this being so, it follows that the doctrine of the spontaneous origination of erysipelas, which still finds favour with some authorities, can have no *locus standi*. As of other diseases of parasitic origin, it must be said of this disease, that it is perpetuated solely in obedience to the law of continuous succession.

Fehleisen's experiments also throw light upon an interesting point before adverted to, viz., the power of the disease to protect the system from its own recurrence. This has been again and again denied, and its alleged absence has been made a cardinal character of distinction between erysipelas and the zymotic diseases commonly so called. Now, besides the six successful cases above cited, Fehleisen inoculated a seventh, and did so twice, but both times with a purely negative result. The patient, a man æt. 20, had suffered from lupus for twelve years, and had experienced many attacks of erysipelas, the last in the course of the preceding summer as he was inoculated in November. Again, case No. 3, a girl æt. 8 with intra-ocular sarcoma, who was successfully inoculated on October 7th, was inoculated again on October 24th, and on November 9th, but both times without success. To meet the objection that the culture might be dead, case No. 5, a woman æt. 29 with extensive lupus of face, was inoculated with the residue of the same. Though she too had had a previous attack of erysipelas, but in her case some ten months before, the inoculation was successful. The process seemed to be modified, however, by the circumstance, as it was of unusually short duration; and, what is further to be noted is, that a second inoculation, performed on this same patient thirty-three days after, did not take effect. Hence it is clear that a certain immunity is acquired by a previous attack, and the question of distinction of erysipelas on this ground from other zymotic diseases resolves itself into a mere question of degree.

In conclusion, I cannot help expressing my deep sense of the value to scientific medicine of these researches of Fehleisen's, supplemented, as they have been, by experiments concerning the effects of antiseptics on the vitality of the micrococci, a subject, I need not say, of the utmost practical importance.

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